# Online Appendix:

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First-order correction to counter the effect of eccentricity on the hole-drilling integral method with strain-gage rosettes

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**Table 1.** Type A rosette, ASTM E837–13a, $D = 5.13$ mm, $G_L = 1.59$ mm, $G_W = 1.59$ mm, $D_0 = 2.0$ mm, $\Delta Z = 0.05$ mm.

Matrix $\bar{\mathbf{a}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.613 | | | | | | | | | | | | | | | | | | |
| 7.932 | 7.099 | | | | | | | | | | | | | | | | | |
| 9.040 | 8.359 | 7.296 | | | | | | | | | | | | | | | | |
| 10.018 | 9.360 | 8.540 | 7.291 | | | | | | | | | | | | | | | |
| 10.886 | 10.230 | 9.473 | 8.521 | 7.132 | | | | | | | | | | | | | | |
| 11.654 | 10.994 | 10.263 | 9.400 | 8.342 | 6.856 | | | | | | | | | | | | | |
| 12.331 | 11.666 | 10.945 | 10.125 | 9.172 | 8.036 | 6.491 | | | | | | | | | | | | |
| 12.926 | 12.256 | 11.538 | 10.740 | 9.840 | 8.818 | 7.633 | 6.065 | | | | | | | | | | | |
| 13.447 | 12.771 | 12.054 | 11.267 | 10.397 | 9.434 | 8.367 | 7.159 | 5.598 | | | | | | | | | | |
| 13.900 | 13.219 | 12.502 | 11.721 | 10.868 | 9.940 | 8.935 | 7.846 | 6.640 | 5.110 | | | | | | | | | |
| 14.294 | 13.609 | 12.889 | 12.113 | 11.270 | 10.363 | 9.395 | 8.369 | 7.279 | 6.093 | 4.614 | | | | | | | | |
| 14.635 | 13.946 | 13.224 | 12.449 | 11.613 | 10.719 | 9.774 | 8.786 | 7.758 | 6.686 | 5.538 | 4.124 | | | | | | | |
| 14.929 | 14.237 | 13.513 | 12.738 | 11.907 | 11.021 | 10.091 | 9.127 | 8.137 | 7.125 | 6.085 | 4.986 | 3.649 | | | | | | |
| 15.183 | 14.488 | 13.762 | 12.987 | 12.157 | 11.278 | 10.358 | 9.410 | 8.443 | 7.467 | 6.485 | 5.489 | 4.449 | 3.194 | | | | | |
| 15.402 | 14.704 | 13.976 | 13.200 | 12.372 | 11.496 | 10.583 | 9.645 | 8.695 | 7.742 | 6.795 | 5.853 | 4.909 | 3.933 | 2.766 | | | | |
| 15.590 | 14.890 | 14.160 | 13.383 | 12.555 | 11.681 | 10.773 | 9.843 | 8.903 | 7.967 | 7.041 | 6.132 | 5.239 | 4.353 | 3.445 | 2.366 | | | |
| 15.752 | 15.049 | 14.318 | 13.539 | 12.711 | 11.839 | 10.934 | 10.008 | 9.077 | 8.151 | 7.241 | 6.352 | 5.490 | 4.651 | 3.826 | 2.988 | 1.996 | | |
| 15.891 | 15.186 | 14.453 | 13.673 | 12.845 | 11.973 | 11.070 | 10.148 | 9.222 | 8.304 | 7.404 | 6.530 | 5.687 | 4.876 | 4.095 | 3.333 | 2.563 | 1.656 | |
| 16.010 | 15.304 | 14.569 | 13.788 | 12.959 | 12.088 | 11.186 | 10.266 | 9.344 | 8.431 | 7.538 | 6.674 | 5.845 | 5.052 | 4.297 | 3.574 | 2.874 | 2.172 | 1.347 |
| 16.112 | 15.405 | 14.668 | 13.886 | 13.056 | 12.185 | 11.284 | 10.366 | 9.446 | 8.537 | 7.649 | 6.792 | 5.972 | 5.192 | 4.453 | 3.754 | 3.091 | 2.452 | 1.814 | 1.067 |

Matrix $\bar{\mathbf{b}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.231 | | | | | | | | | | | | | | | | | | |
| 14.104 | 13.199 | | | | | | | | | | | | | | | | | |
| 15.700 | 15.074 | 13.749 | | | | | | | | | | | | | | | | |
| 17.137 | 16.593 | 15.665 | 14.003 | | | | | | | | | | | | | | | |
| 18.438 | 17.938 | 17.139 | 15.949 | 14.021 | | | | | | | | | | | | | | |
| 19.612 | 19.143 | 18.412 | 17.382 | 15.977 | 13.850 | | | | | | | | | | | | | |
| 20.665 | 20.222 | 19.535 | 18.591 | 17.366 | 15.792 | 13.525 | | | | | | | | | | | | |
| 21.605 | 21.184 | 20.528 | 19.639 | 18.512 | 17.130 | 15.433 | 13.081 | | | | | | | | | | | |
| 22.439 | 22.038 | 21.407 | 20.556 | 19.490 | 18.213 | 16.714 | 14.937 | 12.546 | | | | | | | | | | |
| 23.175 | 22.793 | 22.181 | 21.357 | 20.335 | 19.124 | 17.734 | 16.156 | 14.336 | 11.948 | | | | | | | | | |
| 23.822 | 23.456 | 22.860 | 22.059 | 21.067 | 19.902 | 18.580 | 17.111 | 15.489 | 13.660 | 11.308 | | | | | | | | |
| 24.387 | 24.036 | 23.455 | 22.671 | 21.702 | 20.570 | 19.295 | 17.895 | 16.381 | 14.745 | 12.935 | 10.645 | | | | | | | |
| 24.880 | 24.542 | 23.974 | 23.203 | 22.253 | 21.145 | 19.904 | 18.551 | 17.105 | 15.575 | 13.951 | 12.182 | 9.975 | | | | | | |
| 25.308 | 24.982 | 24.425 | 23.666 | 22.730 | 21.641 | 20.424 | 19.106 | 17.706 | 16.242 | 14.720 | 13.129 | 11.419 | 9.310 | | | | | |
| 25.678 | 25.364 | 24.815 | 24.067 | 23.143 | 22.068 | 20.871 | 19.577 | 18.210 | 16.791 | 15.333 | 13.839 | 12.298 | 10.659 | 8.658 | | | | |
| 25.998 | 25.693 | 25.154 | 24.413 | 23.499 | 22.436 | 21.253 | 19.978 | 18.637 | 17.250 | 15.835 | 14.402 | 12.953 | 11.473 | 9.914 | 8.026 | | | |
| 26.274 | 25.978 | 25.445 | 24.713 | 23.806 | 22.753 | 21.582 | 20.321 | 18.998 | 17.635 | 16.251 | 14.859 | 13.468 | 12.074 | 10.665 | 9.191 | 7.420 | | |
| 26.511 | 26.223 | 25.697 | 24.970 | 24.070 | 23.025 | 21.863 | 20.614 | 19.305 | 17.960 | 16.599 | 15.237 | 13.884 | 12.545 | 11.216 | 9.882 | 8.497 | 6.843 | |
| 26.715 | 26.433 | 25.913 | 25.192 | 24.298 | 23.259 | 22.105 | 20.865 | 19.567 | 18.235 | 16.891 | 15.550 | 14.226 | 12.923 | 11.645 | 10.387 | 9.131 | 7.835 | 6.296 |
| 26.890 | 26.614 | 26.099 | 25.382 | 24.493 | 23.459 | 22.311 | 21.079 | 19.789 | 18.469 | 17.138 | 15.813 | 14.509 | 13.232 | 11.989 | 10.777 | 9.592 | 8.416 | 7.208 | 5.781 |

**Table 2.** Type A rosette, ASTM E837–13a, $D = 0.202$ in., $G_L = 0.062$ in., $G_W = 0.062$ in., $D_0 = 0.08$ in., $\Delta Z = 0.002$ in.

Matrix $\bar{\mathbf{a}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.967 | | | | | | | | | | | | | | | | | | |
| 8.366 | 7.477 | | | | | | | | | | | | | | | | | |
| 9.542 | 8.813 | 7.676 | | | | | | | | | | | | | | | | |
| 10.580 | 9.874 | 8.995 | 7.658 | | | | | | | | | | | | | | | |
| 11.500 | 10.796 | 9.983 | 8.961 | 7.475 | | | | | | | | | | | | | | |
| 12.314 | 11.605 | 10.817 | 9.890 | 8.754 | 7.167 | | | | | | | | | | | | | |
| 13.030 | 12.315 | 11.538 | 10.654 | 9.630 | 8.412 | 7.766 | | | | | | | | | | | | |
| 13.659 | 12.936 | 12.163 | 11.302 | 10.332 | 9.235 | 7.967 | 6.301 | | | | | | | | | | | |
| 14.207 | 13.479 | 12.705 | 11.856 | 10.917 | 9.882 | 8.739 | 7.450 | 5.795 | | | | | | | | | | |
| 14.683 | 13.950 | 13.175 | 12.332 | 11.412 | 10.411 | 9.333 | 8.169 | 6.885 | 5.268 | | | | | | | | | |
| 15.096 | 14.358 | 13.581 | 12.741 | 11.832 | 10.853 | 9.813 | 8.714 | 7.553 | 6.296 | 4.737 | | | | | | | | |
| 15.453 | 14.710 | 13.931 | 13.093 | 12.189 | 11.225 | 10.208 | 9.148 | 8.051 | 6.913 | 5.699 | 4.215 | | | | | | | |
| 15.760 | 15.014 | 14.232 | 13.394 | 12.494 | 11.539 | 10.537 | 9.502 | 8.444 | 7.367 | 6.267 | 5.110 | 3.711 | | | | | | |
| 16.025 | 15.275 | 14.490 | 13.652 | 12.754 | 11.804 | 10.813 | 9.795 | 8.761 | 7.722 | 6.680 | 5.630 | 4.539 | 3.231 | | | | | |
| 16.252 | 15.499 | 14.712 | 13.872 | 12.976 | 12.030 | 11.046 | 10.038 | 9.021 | 8.005 | 6.999 | 6.004 | 5.013 | 3.993 | 2.781 | | | | |
| 16.447 | 15.691 | 14.902 | 14.061 | 13.165 | 12.221 | 11.241 | 10.241 | 9.235 | 8.236 | 7.253 | 6.291 | 5.352 | 4.424 | 3.479 | 2.362 | | | |
| 16.614 | 15.856 | 15.065 | 14.222 | 13.326 | 12.383 | 11.407 | 10.412 | 9.413 | 8.425 | 7.457 | 6.517 | 5.609 | 4.730 | 3.870 | 3.000 | 1.977 | | |
| 16.757 | 15.997 | 15.204 | 14.360 | 13.463 | 12.521 | 11.546 | 10.555 | 9.562 | 8.581 | 7.624 | 6.699 | 5.810 | 4.960 | 4.144 | 3.352 | 2.557 | 1.625 | |
| 16.879 | 16.117 | 15.322 | 14.477 | 13.580 | 12.638 | 11.664 | 10.675 | 9.686 | 8.710 | 7.761 | 6.846 | 5.971 | 5.139 | 4.349 | 3.598 | 2.874 | 2.151 | 1.306 |
| 16.984 | 16.220 | 15.424 | 14.578 | 13.680 | 12.737 | 11.764 | 10.777 | 9.790 | 8.818 | 7.874 | 6.966 | 6.100 | 5.281 | 4.508 | 3.781 | 3.093 | 2.435 | 1.781 | 1.019 |

Matrix $\bar{\mathbf{b}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.869 | | | | | | | | | | | | | | | | | | |
| 14.858 | 13.887 | | | | | | | | | | | | | | | | | |
| 16.554 | 15.880 | 14.456 | | | | | | | | | | | | | | | | |
| 18.082 | 17.493 | 16.492 | 14.706 | | | | | | | | | | | | | | | |
| 19.463 | 18.920 | 18.055 | 16.772 | 14.704 | | | | | | | | | | | | | | |
| 20.707 | 20.197 | 19.404 | 18.290 | 16.776 | 14.497 | | | | | | | | | | | | | |
| 21.821 | 21.338 | 20.591 | 19.569 | 18.245 | 16.552 | 14.128 | | | | | | | | | | | | |
| 22.814 | 22.354 | 21.640 | 20.674 | 19.454 | 17.964 | 16.143 | 13.633 | | | | | | | | | | | |
| 23.692 | 23.253 | 22.565 | 21.639 | 20.483 | 19.104 | 17.491 | 15.588 | 13.044 | | | | | | | | | | |
| 24.465 | 24.046 | 23.377 | 22.481 | 21.370 | 20.060 | 18.561 | 16.868 | 14.926 | 12.392 | | | | | | | | | |
| 25.143 | 24.740 | 24.089 | 23.215 | 22.136 | 20.874 | 19.447 | 17.868 | 16.133 | 14.187 | 11.699 | | | | | | | | |
| 25.733 | 25.347 | 24.711 | 23.854 | 22.800 | 21.571 | 20.193 | 18.686 | 17.064 | 15.319 | 13.400 | 10.985 | | | | | | | |
| 26.246 | 25.874 | 25.251 | 24.409 | 23.373 | 22.170 | 20.827 | 19.369 | 17.818 | 16.183 | 14.457 | 12.587 | 10.267 | | | | | | |
| 26.691 | 26.331 | 25.719 | 24.890 | 23.869 | 22.685 | 21.368 | 19.945 | 18.442 | 16.876 | 15.256 | 13.571 | 11.768 | 9.558 | | | | | |
| 27.074 | 26.726 | 26.124 | 25.305 | 24.296 | 23.128 | 21.830 | 20.433 | 18.964 | 17.445 | 15.891 | 14.306 | 12.679 | 10.957 | 8.866 | | | | |
| 27.405 | 27.067 | 26.473 | 25.663 | 24.664 | 23.508 | 22.225 | 20.848 | 19.404 | 17.918 | 16.409 | 14.887 | 13.355 | 11.798 | 10.165 | 8.199 | | | |
| 27.689 | 27.360 | 26.774 | 25.971 | 24.981 | 23.834 | 22.563 | 21.201 | 19.776 | 18.315 | 16.837 | 15.358 | 13.885 | 12.418 | 10.939 | 9.401 | 7.561 | | |
| 27.933 | 27.611 | 27.032 | 26.236 | 25.252 | 24.113 | 22.852 | 21.502 | 20.092 | 18.648 | 17.194 | 15.746 | 14.313 | 12.901 | 11.506 | 10.111 | 8.669 | 6.956 | |
| 28.142 | 27.827 | 27.254 | 26.463 | 25.485 | 24.353 | 23.100 | 21.758 | 20.359 | 18.930 | 17.494 | 16.067 | 14.663 | 13.288 | 11.945 | 10.628 | 9.319 | 7.974 | 6.385 |
| 28.321 | 28.012 | 27.443 | 26.657 | 25.684 | 24.558 | 23.311 | 21.977 | 20.587 | 19.169 | 17.746 | 16.335 | 14.952 | 13.604 | 12.296 | 11.027 | 9.790 | 8.568 | 7.318 | 5.848 |

**Table 3.** Type B rosette, ASTM E837–13a, $D = 5.13$ mm, $G_L = 1.59$ mm, $G_W = 1.14$ mm, $D_0 = 2.0$ mm, $\Delta Z = 0.05$ mm.

Matrix $\bar{\mathbf{a}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.017 | | | | | | | | | | | | | | | | | | |
| 8.423 | 7.531 | | | | | | | | | | | | | | | | | |
| 9.605 | 8.874 | 7.734 | | | | | | | | | | | | | | | | |
| 10.649 | 9.941 | 9.059 | 7.718 | | | | | | | | | | | | | | | |
| 11.574 | 10.868 | 10.053 | 9.029 | 7.538 | | | | | | | | | | | | | | |
| 12.392 | 11.681 | 10.893 | 9.964 | 8.825 | 7.233 | | | | | | | | | | | | | |
| 13.112 | 12.395 | 11.618 | 10.733 | 9.706 | 8.486 | 6.834 | | | | | | | | | | | | |
| 13.744 | 13.021 | 12.247 | 11.385 | 10.414 | 9.315 | 8.044 | 6.370 | | | | | | | | | | | |
| 14.296 | 13.567 | 12.793 | 11.943 | 11.003 | 9.966 | 8.821 | 7.528 | 5.865 | | | | | | | | | | |
| 14.776 | 14.041 | 13.266 | 12.423 | 11.501 | 10.500 | 9.420 | 8.253 | 6.964 | 5.339 | | | | | | | | | |
| 15.192 | 14.453 | 13.675 | 12.835 | 11.925 | 10.946 | 9.904 | 8.803 | 7.638 | 6.375 | 4.808 | | | | | | | | |
| 15.551 | 14.808 | 14.028 | 13.190 | 12.286 | 11.321 | 10.303 | 9.241 | 8.141 | 6.998 | 5.779 | 4.285 | | | | | | | |
| 15.861 | 15.114 | 14.332 | 13.494 | 12.594 | 11.638 | 10.636 | 9.599 | 8.538 | 7.458 | 6.353 | 5.189 | 3.780 | | | | | | |
| 16.128 | 15.378 | 14.593 | 13.754 | 12.857 | 11.906 | 10.915 | 9.895 | 8.859 | 7.816 | 6.771 | 5.715 | 4.617 | 3.299 | | | | | |
| 16.357 | 15.604 | 14.817 | 13.977 | 13.081 | 12.134 | 11.150 | 10.141 | 9.122 | 8.103 | 7.094 | 6.095 | 5.098 | 4.071 | 2.848 | | | | |
| 16.554 | 15.798 | 15.009 | 14.168 | 13.272 | 12.328 | 11.348 | 10.347 | 9.339 | 8.337 | 7.351 | 6.386 | 5.441 | 4.508 | 3.556 | 2.427 | | | |
| 16.723 | 15.965 | 15.173 | 14.331 | 13.435 | 12.492 | 11.515 | 10.519 | 9.519 | 8.529 | 7.558 | 6.615 | 5.702 | 4.818 | 3.952 | 3.075 | 2.040 | | |
| 16.867 | 16.107 | 15.314 | 14.471 | 13.574 | 12.632 | 11.657 | 10.665 | 9.670 | 8.687 | 7.728 | 6.799 | 5.907 | 5.052 | 4.231 | 3.433 | 2.630 | 1.687 | |
| 16.992 | 16.229 | 15.435 | 14.590 | 13.693 | 12.751 | 11.777 | 10.787 | 9.796 | 8.819 | 7.867 | 6.949 | 6.070 | 5.234 | 4.440 | 3.683 | 2.952 | 2.221 | 1.365 |
| 17.098 | 16.334 | 15.538 | 14.692 | 13.794 | 12.852 | 11.879 | 10.890 | 9.902 | 8.929 | 7.982 | 7.071 | 6.202 | 5.378 | 4.601 | 3.869 | 3.176 | 2.510 | 1.848 | 1.076 |

Matrix $\bar{\mathbf{b}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.445 | | | | | | | | | | | | | | | | | | |
| 15.532 | 14.529 | | | | | | | | | | | | | | | | | |
| 17.313 | 16.622 | 15.144 | | | | | | | | | | | | | | | | |
| 18.920 | 18.318 | 17.285 | 15.427 | | | | | | | | | | | | | | | |
| 20.374 | 19.822 | 18.931 | 17.602 | 15.445 | | | | | | | | | | | | | | |
| 21.687 | 21.169 | 20.354 | 19.203 | 17.631 | 15.250 | | | | | | | | | | | | | |
| 22.864 | 22.374 | 21.608 | 20.554 | 19.182 | 17.420 | 14.883 | | | | | | | | | | | | |
| 23.914 | 23.449 | 22.718 | 21.724 | 20.461 | 18.913 | 17.014 | 14.384 | | | | | | | | | | | |
| 24.845 | 24.402 | 23.698 | 22.745 | 21.552 | 20.121 | 18.443 | 16.456 | 13.786 | | | | | | | | | | |
| 25.665 | 25.243 | 24.561 | 23.639 | 22.493 | 21.136 | 19.579 | 17.814 | 15.782 | 13.118 | | | | | | | | | |
| 26.386 | 25.982 | 25.318 | 24.420 | 23.308 | 22.002 | 20.521 | 18.878 | 17.066 | 15.027 | 12.407 | | | | | | | | |
| 27.015 | 26.628 | 25.980 | 25.102 | 24.015 | 22.745 | 21.316 | 19.750 | 18.058 | 16.234 | 14.219 | 11.672 | | | | | | | |
| 27.563 | 27.191 | 26.557 | 25.694 | 24.628 | 23.385 | 21.993 | 20.479 | 18.863 | 17.156 | 15.348 | 13.383 | 10.931 | | | | | | |
| 28.038 | 27.680 | 27.058 | 26.208 | 25.158 | 23.936 | 22.572 | 21.095 | 19.531 | 17.897 | 16.203 | 14.435 | 12.537 | 10.198 | | | | | |
| 28.450 | 28.103 | 27.492 | 26.653 | 25.616 | 24.410 | 23.067 | 21.618 | 20.091 | 18.508 | 16.884 | 15.224 | 13.514 | 11.698 | 9.481 | | | | |
| 28.805 | 28.470 | 27.867 | 27.038 | 26.012 | 24.819 | 23.492 | 22.064 | 20.564 | 19.016 | 17.441 | 15.848 | 14.241 | 12.602 | 10.878 | 8.789 | | | |
| 29.111 | 28.785 | 28.191 | 27.370 | 26.353 | 25.170 | 23.857 | 22.445 | 20.965 | 19.444 | 17.902 | 16.356 | 14.812 | 13.270 | 11.712 | 10.084 | 8.126 | | |
| 29.375 | 29.057 | 28.470 | 27.656 | 26.646 | 25.473 | 24.169 | 22.770 | 21.306 | 19.804 | 18.288 | 16.775 | 15.274 | 13.792 | 12.324 | 10.851 | 9.323 | 7.496 | |
| 29.601 | 29.291 | 28.711 | 27.902 | 26.899 | 25.732 | 24.437 | 23.048 | 21.596 | 20.110 | 18.613 | 17.123 | 15.654 | 14.212 | 12.800 | 11.412 | 10.028 | 8.599 | 6.901 |
| 29.795 | 29.492 | 28.917 | 28.114 | 27.115 | 25.955 | 24.667 | 23.286 | 21.844 | 20.369 | 18.887 | 17.415 | 15.968 | 14.556 | 13.182 | 11.846 | 10.540 | 9.245 | 7.915 | 6.341 |

**Table 4.** Type B rosette, ASTM E837–13a, $D = 0.202$ in., $G_L = 0.062$ in., $G_W = 0.045$ in., $D_0 = 0.08$ in., $\Delta Z = 0.002$ in.

Matrix $\bar{\mathbf{a}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.373 | | | | | | | | | | | | | | | | | | |
| 8.861 | 7.910 | | | | | | | | | | | | | | | | | |
| 10.111 | 9.330 | 8.114 | | | | | | | | | | | | | | | | |
| 11.215 | 10.459 | 9.515 | 8.085 | | | | | | | | | | | | | | | |
| 12.193 | 11.437 | 10.564 | 9.468 | 7.879 | | | | | | | | | | | | | | |
| 13.057 | 12.296 | 11.449 | 10.453 | 9.236 | 7.540 | | | | | | | | | | | | | |
| 13.817 | 13.048 | 12.213 | 11.262 | 10.162 | 8.859 | 7.103 | | | | | | | | | | | | |
| 14.482 | 13.706 | 12.874 | 11.947 | 10.905 | 9.728 | 8.373 | 6.600 | | | | | | | | | | | |
| 15.062 | 14.279 | 13.446 | 12.532 | 11.522 | 10.410 | 9.186 | 7.812 | 6.054 | | | | | | | | | | |
| 15.565 | 14.776 | 13.942 | 13.034 | 12.043 | 10.968 | 9.812 | 8.568 | 7.202 | 5.490 | | | | | | | | | |
| 16.000 | 15.205 | 14.369 | 13.464 | 12.484 | 11.432 | 10.315 | 9.141 | 7.903 | 6.569 | 4.923 | | | | | | | | |
| 16.375 | 15.576 | 14.736 | 13.833 | 12.859 | 11.821 | 10.730 | 9.596 | 8.426 | 7.215 | 5.931 | 4.368 | | | | | | | |
| 16.697 | 15.894 | 15.052 | 14.148 | 13.179 | 12.150 | 11.075 | 9.966 | 8.836 | 7.691 | 6.525 | 5.304 | 3.834 | | | | | | |
| 16.974 | 16.167 | 15.322 | 14.418 | 13.450 | 12.428 | 11.363 | 10.271 | 9.167 | 8.060 | 6.956 | 5.846 | 4.698 | 3.329 | | | | | |
| 17.211 | 16.401 | 15.554 | 14.648 | 13.682 | 12.663 | 11.605 | 10.525 | 9.437 | 8.356 | 7.288 | 6.236 | 5.192 | 4.123 | 2.856 | | | | |
| 17.414 | 16.601 | 15.751 | 14.845 | 13.878 | 12.862 | 11.809 | 10.736 | 9.660 | 8.595 | 7.551 | 6.534 | 5.544 | 4.571 | 3.582 | 2.418 | | | |
| 17.588 | 16.773 | 15.920 | 15.012 | 14.046 | 13.030 | 11.980 | 10.913 | 9.845 | 8.792 | 7.764 | 6.769 | 5.811 | 4.887 | 3.987 | 3.080 | 2.017 | | |
| 17.737 | 16.919 | 16.065 | 15.155 | 14.188 | 13.173 | 12.125 | 11.061 | 9.999 | 8.953 | 7.936 | 6.957 | 6.019 | 5.125 | 4.271 | 3.445 | 2.617 | 1.651 | |
| 17.864 | 17.044 | 16.188 | 15.277 | 14.309 | 13.294 | 12.247 | 11.186 | 10.127 | 9.087 | 8.078 | 7.108 | 6.185 | 5.310 | 4.483 | 3.698 | 2.945 | 2.194 | 1.321 |
| 17.973 | 17.151 | 16.293 | 15.381 | 14.412 | 13.397 | 12.351 | 11.291 | 10.235 | 9.199 | 8.194 | 7.232 | 6.319 | 5.456 | 4.647 | 3.887 | 3.171 | 2.487 | 1.810 | 1.024 |

Matrix $\bar{\mathbf{b}}$ coefficients ($\times 10^3$)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14.079 | | | | | | | | | | | | | | | | | | |
| 16.285 | 15.213 | | | | | | | | | | | | | | | | | |
| 18.169 | 17.426 | 15.847 | | | | | | | | | | | | | | | | |
| 19.867 | 19.218 | 18.109 | 16.123 | | | | | | | | | | | | | | | |
| 21.403 | 20.805 | 19.846 | 18.420 | 16.117 | | | | | | | | | | | | | | |
| 22.786 | 22.225 | 21.346 | 20.107 | 18.421 | 15.883 | | | | | | | | | | | | | |
| 24.025 | 23.493 | 22.665 | 21.527 | 20.052 | 18.167 | 15.468 | | | | | | | | | | | | |
| 25.128 | 24.621 | 23.829 | 22.754 | 21.394 | 19.734 | 17.707 | 14.915 | | | | | | | | | | | |
| 26.103 | 25.620 | 24.855 | 23.824 | 22.536 | 20.998 | 19.202 | 17.086 | 14.261 | | | | | | | | | | |
| 26.960 | 26.498 | 25.756 | 24.758 | 23.519 | 22.058 | 20.388 | 18.504 | 16.347 | 13.536 | | | | | | | | | |
| 27.710 | 27.268 | 26.545 | 25.571 | 24.368 | 22.959 | 21.369 | 19.612 | 17.684 | 15.526 | 12.770 | | | | | | | | |
| 28.364 | 27.939 | 27.233 | 26.278 | 25.102 | 23.731 | 22.194 | 20.517 | 18.715 | 16.780 | 14.654 | 11.983 | | | | | | | |
| 28.932 | 28.523 | 27.830 | 26.892 | 25.736 | 24.393 | 22.895 | 21.272 | 19.548 | 17.735 | 15.824 | 13.757 | 11.195 | | | | | | |
| 29.423 | 29.028 | 28.348 | 27.423 | 26.284 | 24.962 | 23.493 | 21.909 | 20.237 | 18.500 | 16.706 | 14.844 | 12.855 | 10.417 | | | | | |
| 29.847 | 29.464 | 28.796 | 27.882 | 26.756 | 25.451 | 24.003 | 22.447 | 20.814 | 19.129 | 17.408 | 15.657 | 13.862 | 11.965 | 9.661 | | | | |
| 30.212 | 29.841 | 29.181 | 28.278 | 27.162 | 25.871 | 24.440 | 22.905 | 21.300 | 19.651 | 17.980 | 16.298 | 14.608 | 12.894 | 11.098 | 8.934 | | | |
| 30.526 | 30.164 | 29.513 | 28.618 | 27.512 | 26.231 | 24.813 | 23.295 | 21.711 | 20.089 | 18.453 | 16.818 | 15.194 | 13.578 | 11.952 | 10.262 | 8.240 | | |
| 30.795 | 30.442 | 29.799 | 28.910 | 27.812 | 26.540 | 25.132 | 23.627 | 22.059 | 20.457 | 18.847 | 17.246 | 15.666 | 14.111 | 12.578 | 11.047 | 9.465 | 7.583 | |
| 31.026 | 30.680 | 30.043 | 29.161 | 28.069 | 26.804 | 25.405 | 23.911 | 22.355 | 20.769 | 19.177 | 17.601 | 16.052 | 14.539 | 13.063 | 11.618 | 10.183 | 8.709 | 6.964 |
| 31.224 | 30.885 | 30.253 | 29.376 | 28.289 | 27.031 | 25.639 | 24.152 | 22.606 | 21.032 | 19.456 | 17.897 | 16.372 | 14.888 | 13.451 | 12.059 | 10.704 | 9.366 | 7.997 | 6.384 |

**Table 5.** Type A rosette, ASTM E837–13a, $D = 5.13$ mm, $G_L = 1.59$ mm, $G_W = 1.59$ mm, $D_0 = 2.0$ mm, $\Delta Z = 0.05$ mm, coefficients of the derivative matrix $\bar{\alpha}_{e1}$.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.07245 | -0.00773 | 0 |
| -0.00535 | -0.04035 | -0.05661 |
| 0 | 0 | -0.04942 |
| 0.087771 | -0.00793 | 0 | 0.077439 | -0.00867 | 0 |
| -0.00796 | -0.0484 | -0.06756 | -0.00516 | -0.04339 | -0.06079 |
| 0 | 0 | -0.0571 | 0 | 0 | -0.05399 |
| 0.100818 | -0.00815 | 0 | 0.09242 | -0.00924 | 0 | 0.078126 | -0.00947 | 0 |
| -0.01014 | -0.05528 | -0.07692 | -0.00749 | -0.05124 | -0.07177 | -0.00407 | -0.04441 | -0.06185 |
| 0 | 0 | -0.06374 | 0 | 0 | -0.06177 | 0 | 0 | -0.05698 |
| 0.112371 | -0.0084 | 0 | 0.104266 | -0.00975 | 0 | 0.092992 | -0.0103 | 0 | 0.075669 | -0.01013 | 0 |
| -0.01198 | -0.06141 | -0.08525 | -0.00922 | -0.0575 | -0.08049 | -0.00617 | -0.05222 | -0.07292 | -0.00231 | -0.04397 | -0.06059 |
| 0 | 0 | -0.06979 | 0 | 0 | -0.06817 | 0 | 0 | -0.06503 | 0 | 0 | -0.05884 |
| 0.122506 | -0.00866 | 0 | 0.114437 | -0.01024 | 0 | 0.103911 | -0.01098 | 0 | 0.090196 | -0.01112 | 0 | 0.070864 | -0.01063 | 0 |
| -0.0135 | -0.06686 | -0.09259 | -0.01061 | -0.06296 | -0.08801 | -0.00755 | -0.05806 | -0.08112 | -0.00416 | -0.05169 | -0.07154 | -0.00011 | -0.04244 | -0.05756 |
| 0 | 0 | -0.07534 | 0 | 0 | -0.07391 | 0 | 0 | -0.07132 | 0 | 0 | -0.06713 | 0 | 0 | -0.05979 |
| 0.131265 | -0.0089 | 0 | 0.123165 | -0.01068 | 0 | 0.11292 | -0.01159 | 0 | 0.100216 | -0.0119 | 0 | 0.084766 | -0.01171 | 0 | 0.064409 | -0.01095 | 0 |
| -0.01471 | -0.07167 | -0.09894 | -0.01168 | -0.06773 | -0.09449 | -0.00856 | -0.06298 | -0.08791 | -0.00522 | -0.05715 | -0.07917 | -0.00164 | -0.04996 | -0.06814 | 0.002346 | -0.04012 | -0.05323 |
| 0 | 0 | -0.08042 | 0 | 0 | -0.07913 | 0 | 0 | -0.07684 | 0 | 0 | -0.07334 | 0 | 0 | -0.06824 | 0 | 0 | -0.05999 |
| 0.138715 | -0.00911 | 0 | 0.130571 | -0.01107 | 0 | 0.120436 | -0.01213 | 0 | 0.108173 | -0.01257 | 0 | 0.093855 | -0.01253 | 0 | 0.077429 | -0.01206 | 0 | 0.056927 | -0.01108 | 0 |
| -0.01562 | -0.07587 | -0.10435 | -0.01248 | -0.07189 | -0.09999 | -0.00928 | -0.0672 | -0.09359 | -0.00591 | -0.06161 | -0.08526 | -0.0024 | -0.05505 | -0.07513 | 0.001163 | -0.04735 | -0.06322 | 0.004876 | -0.03728 | -0.04805 |
| 0 | 0 | -0.08505 | 0 | 0 | -0.08388 | 0 | 0 | -0.08178 | 0 | 0 | -0.07866 | 0 | 0 | -0.07436 | 0 | 0 | -0.06852 | 0 | 0 | -0.05956 |
| 0.144953 | -0.00928 | 0 | 0.136769 | -0.01139 | 0 | 0.126672 | -0.01258 | 0 | 0.11462 | -0.01313 | 0 | 0.100822 | -0.0132 | 0 | 0.085556 | -0.01287 | 0 | 0.068873 | -0.01219 | 0 | 0.048961 | -0.01104 | 0 |
| -0.01628 | -0.0795 | -0.10887 | -0.01303 | -0.07549 | -0.10459 | -0.00975 | -0.07082 | -0.09832 | -0.00632 | -0.06535 | -0.09021 | -0.0028 | -0.05909 | -0.08053 | 0.000699 | -0.05205 | -0.06953 | 0.004065 | -0.04413 | -0.05727 | 0.007331 | -0.03414 | -0.0424 |
| 0 | 0 | -0.08926 | 0 | 0 | -0.08819 | 0 | 0 | -0.08623 | 0 | 0 | -0.08336 | 0 | 0 | -0.07949 | 0 | 0 | -0.07451 | 0 | 0 | -0.06808 | 0 | 0 | -0.0586 |
| 0.150101 | -0.00939 | 0 | 0.141882 | -0.01165 | 0 | 0.13179 | -0.01294 | 0 | 0.119843 | -0.01359 | 0 | 0.106311 | -0.01375 | 0 | 0.091587 | -0.01352 | 0 | 0.076029 | -0.01296 | 0 | 0.05971 | -0.0121 | 0 | 0.040952 | -0.01084 | 0 |
| -0.01671 | -0.08262 | -0.11259 | -0.01337 | -0.07859 | -0.10839 | -0.01001 | -0.07391 | -0.10219 | -0.00652 | -0.06851 | -0.09423 | -0.00297 | -0.06242 | -0.0848 | 0.000547 | -0.05571 | -0.07425 | 0.003877 | -0.04845 | -0.06287 | 0.006896 | -0.04056 | -0.05074 | 0.009597 | -0.0309 | -0.03661 |
| 0 | 0 | -0.09305 | 0 | 0 | -0.09209 | 0 | 0 | -0.09024 | 0 | 0 | -0.08754 | 0 | 0 | -0.08396 | 0 | 0 | -0.07945 | 0 | 0 | -0.07392 | 0 | 0 | -0.06704 | 0 | 0 | -0.05722 |
| 0.154289 | -0.00947 | 0 | 0.146042 | -0.01184 | 0 | 0.135942 | -0.01323 | 0 | 0.124044 | -0.01396 | 0 | 0.110654 | -0.01419 | 0 | 0.096214 | -0.01403 | 0 | 0.081183 | -0.01356 | 0 | 0.065912 | -0.01281 | 0 | 0.050446 | -0.01183 | 0 | 0.033238 | -0.01051 | 0 |
| -0.01696 | -0.08528 | -0.11561 | -0.01353 | -0.08123 | -0.11146 | -0.0101 | -0.07655 | -0.10533 | -0.00656 | -0.07119 | -0.09746 | -0.00296 | -0.06518 | -0.08818 | 0.000593 | -0.05866 | -0.07788 | 0.003944 | -0.05174 | -0.06694 | 0.006961 | -0.0445 | -0.05563 | 0.009526 | -0.03684 | -0.04401 | 0.011594 | -0.02768 | -0.03093 |
| 0 | 0 | -0.09647 | 0 | 0 | -0.09559 | 0 | 0 | -0.09384 | 0 | 0 | -0.09127 | 0 | 0 | -0.08788 | 0 | 0 | -0.08369 | 0 | 0 | -0.07866 | 0 | 0 | -0.0727 | 0 | 0 | -0.06551 | 0 | 0 | -0.0555 |
| 0.157651 | -0.0095 | 0 | 0.149382 | -0.01197 | 0 | 0.139267 | -0.01345 | 0 | 0.12739 | -0.01425 | 0 | 0.114075 | -0.01454 | 0 | 0.099791 | -0.01444 | 0 | 0.085039 | -0.01402 | 0 | 0.070257 | -0.01335 | 0 | 0.055738 | -0.01248 | 0 | 0.041475 | -0.0114 | 0 | 0.026053 | -0.01006 | 0 |
| -0.01705 | -0.08754 | -0.11801 | -0.01355 | -0.08347 | -0.11392 | -0.01006 | -0.07879 | -0.10783 | -0.00646 | -0.07345 | -0.10002 | -0.00281 | -0.0675 | -0.09084 | 0.000777 | -0.06109 | -0.08069 | 0.004167 | -0.05436 | -0.06999 | 0.007219 | -0.04745 | -0.05909 | 0.009817 | -0.04041 | -0.04821 | 0.011864 | -0.03314 | -0.03738 | 0.013276 | -0.0246 | -0.02553 |
| 0 | 0 | -0.09953 | 0 | 0 | -0.09873 | 0 | 0 | -0.09706 | 0 | 0 | -0.09459 | 0 | 0 | -0.09136 | 0 | 0 | -0.08738 | 0 | 0 | -0.08267 | 0 | 0 | -0.07723 | 0 | 0 | -0.07097 | 0 | 0 | -0.0636 | 0 | 0 | -0.05354 |
| 0.160314 | -0.0095 | 0 | 0.152027 | -0.01205 | 0 | 0.141896 | -0.0136 | 0 | 0.130023 | -0.01446 | 0 | 0.116746 | -0.0148 | 0 | 0.102549 | -0.01475 | 0 | 0.087952 | -0.01438 | 0 | 0.073428 | -0.01377 | 0 | 0.059346 | -0.01295 | 0 | 0.045916 | -0.01198 | 0 | 0.033074 | -0.01086 | 0 | 0.019542 | -0.00952 | 0 |
| -0.01703 | -0.08945 | -0.11989 | -0.01346 | -0.08537 | -0.11585 | -0.00992 | -0.08068 | -0.1098 | -0.00627 | -0.07535 | -0.10203 | -0.00258 | -0.06944 | -0.09292 | 0.001055 | -0.06309 | -0.08286 | 0.004487 | -0.05649 | -0.0723 | 0.007586 | -0.04977 | -0.06162 | 0.010237 | -0.04305 | -0.0511 | 0.012352 | -0.03636 | -0.04093 | 0.013853 | -0.02958 | -0.03106 | 0.014625 | -0.02173 | -0.02055 |
| 0 | 0 | -0.10226 | 0 | 0 | -0.10153 | 0 | 0 | -0.09993 | 0 | 0 | -0.09755 | 0 | 0 | -0.09443 | 0 | 0 | -0.09061 | 0 | 0 | -0.08613 | 0 | 0 | -0.08103 | 0 | 0 | -0.07529 | 0 | 0 | -0.06884 | 0 | 0 | -0.06138 | 0 | 0 | -0.05139 |
| 0.162397 | -0.00947 | 0 | 0.154094 | -0.01209 | 0 | 0.143947 | -0.0137 | 0 | 0.13207 | -0.01461 | 0 | 0.118811 | -0.01499 | 0 | 0.10466 | -0.01498 | 0 | 0.090149 | -0.01465 | 0 | 0.075768 | -0.01407 | 0 | 0.061915 | -0.01331 | 0 | 0.048864 | -0.01239 | 0 | 0.036736 | -0.01136 | 0 | 0.025419 | -0.01022 | 0 | 0.013778 | -0.00892 | 0 |
| -0.01692 | -0.09106 | -0.12134 | -0.0133 | -0.08697 | -0.11734 | -0.0097 | -0.08228 | -0.11132 | -0.00601 | -0.07695 | -0.10358 | -0.00228 | -0.07106 | -0.09451 | 0.001395 | -0.06476 | -0.08452 | 0.00487 | -0.05823 | -0.07405 | 0.008014 | -0.05163 | -0.06349 | 0.01072 | -0.0451 | -0.05317 | 0.012904 | -0.03871 | -0.0433 | 0.014508 | -0.03247 | -0.03401 | 0.015471 | -0.02623 | -0.0252 | 0.015646 | -0.0191 | -0.01605 |
| 0 | 0 | -0.10468 | 0 | 0 | -0.10402 | 0 | 0 | -0.10249 | 0 | 0 | -0.10018 | 0 | 0 | -0.09715 | 0 | 0 | -0.09345 | 0 | 0 | -0.08914 | 0 | 0 | -0.08427 | 0 | 0 | -0.07887 | 0 | 0 | -0.07293 | 0 | 0 | -0.06639 | 0 | 0 | -0.05895 | 0 | 0 | -0.04912 |
| 0.164004 | -0.00941 | 0 | 0.155687 | -0.0121 | 0 | 0.145525 | -0.01375 | 0 | 0.133639 | -0.0147 | 0 | 0.120384 | -0.01512 | 0 | 0.106257 | -0.01514 | 0 | 0.091793 | -0.01485 | 0 | 0.077492 | -0.0143 | 0 | 0.063764 | -0.01357 | 0 | 0.050909 | -0.01269 | 0 | 0.0391 | -0.01171 | 0 | 0.028381 | -0.01065 | 0 | 0.018603 | -0.00952 | 0 | 0.008777 | -0.00827 | 0 |
| -0.01674 | -0.09241 | -0.12243 | -0.01308 | -0.08831 | -0.11847 | -0.00944 | -0.08362 | -0.11247 | -0.00571 | -0.0783 | -0.10476 | -0.00194 | -0.07242 | -0.09571 | 0.001773 | -0.06616 | -0.08576 | 0.005286 | -0.05967 | -0.07535 | 0.008474 | -0.05315 | -0.06487 | 0.01123 | -0.04673 | -0.05466 | 0.013478 | -0.04052 | -0.04496 | 0.015167 | -0.03455 | -0.03593 | 0.016263 | -0.02882 | -0.0276 | 0.01672 | -0.02316 | -0.01989 | 0.016358 | -0.01673 | -0.01206 |
| 0 | 0 | -0.10683 | 0 | 0 | -0.10624 | 0 | 0 | -0.10476 | 0 | 0 | -0.10251 | 0 | 0 | -0.09955 | 0 | 0 | -0.09595 | 0 | 0 | -0.09177 | 0 | 0 | -0.08706 | 0 | 0 | -0.0819 | 0 | 0 | -0.0763 | 0 | 0 | -0.07027 | 0 | 0 | -0.06372 | 0 | 0 | -0.05637 | 0 | 0 | -0.04678 |
| 0.165226 | -0.00934 | 0 | 0.156896 | -0.01207 | 0 | 0.146719 | -0.01377 | 0 | 0.134823 | -0.01475 | 0 | 0.121565 | -0.01521 | 0 | 0.107447 | -0.01525 | 0 | 0.093007 | -0.01498 | 0 | 0.078749 | -0.01446 | 0 | 0.065091 | -0.01375 | 0 | 0.05234 | -0.01291 | 0 | 0.040692 | -0.01196 | 0 | 0.030234 | -0.01095 | 0 | 0.020944 | -0.00988 | 0 | 0.012654 | -0.00878 | 0 | 0.00452 | -0.0076 | 0 |
| -0.01653 | -0.09354 | -0.12325 | -0.01282 | -0.08944 | -0.1193 | -0.00914 | -0.08475 | -0.11333 | -0.00538 | -0.07943 | -0.10563 | -0.00157 | -0.07357 | -0.09661 | 0.002169 | -0.06732 | -0.08668 | 0.005718 | -0.06087 | -0.0763 | 0.008944 | -0.0544 | -0.06587 | 0.011745 | -0.04805 | -0.05573 | 0.014049 | -0.04195 | -0.04612 | 0.01581 | -0.03615 | -0.03723 | 0.017006 | -0.03066 | -0.02912 | 0.017621 | -0.02546 | -0.0218 | 0.017619 | -0.02037 | -0.01516 | 0.016791 | -0.01463 | -0.00857 |
| 0 | 0 | -0.10874 | 0 | 0 | -0.1082 | 0 | 0 | -0.10677 | 0 | 0 | -0.10457 | 0 | 0 | -0.10168 | 0 | 0 | -0.09815 | 0 | 0 | -0.09407 | 0 | 0 | -0.08949 | 0 | 0 | -0.0845 | 0 | 0 | -0.07913 | 0 | 0 | -0.07343 | 0 | 0 | -0.06738 | 0 | 0 | -0.0609 | 0 | 0 | -0.05371 | 0 | 0 | -0.04442 |
| 0.166139 | -0.00926 | 0 | 0.157798 | -0.01203 | 0 | 0.147607 | -0.01376 | 0 | 0.135699 | -0.01477 | 0 | 0.122435 | -0.01525 | 0 | 0.108317 | -0.01532 | 0 | 0.093888 | -0.01506 | 0 | 0.079651 | -0.01456 | 0 | 0.066029 | -0.01388 | 0 | 0.053335 | -0.01305 | 0 | 0.041771 | -0.01213 | 0 | 0.03144 | -0.01115 | 0 | 0.022356 | -0.01013 | 0 | 0.014452 | -0.00908 | 0 | 0.007553 | -0.00802 | 0 | 0.000957 | -0.00692 | 0 |
| -0.01628 | -0.09448 | -0.12383 | -0.01254 | -0.09039 | -0.11991 | -0.00883 | -0.0857 | -0.11395 | -0.00504 | -0.08038 | -0.10627 | -0.0012 | -0.07452 | -0.09725 | 0.00257 | -0.06829 | -0.08734 | 0.006149 | -0.06186 | -0.07699 | 0.009411 | -0.05543 | -0.06658 | 0.012252 | -0.04914 | -0.05648 | 0.014603 | -0.0431 | -0.04693 | 0.016424 | -0.0374 | -0.03811 | 0.017698 | -0.03207 | -0.03011 | 0.018426 | -0.02709 | -0.02297 | 0.018604 | -0.02242 | -0.01664 | 0.0182 | -0.01788 | -0.01102 | 0.016979 | -0.01277 | -0.00557 |
| 0 | 0 | -0.11042 | 0 | 0 | -0.10993 | 0 | 0 | -0.10855 | 0 | 0 | -0.1064 | 0 | 0 | -0.10355 | 0 | 0 | -0.10009 | 0 | 0 | -0.09608 | 0 | 0 | -0.09161 | 0 | 0 | -0.08674 | 0 | 0 | -0.08155 | 0 | 0 | -0.07607 | 0 | 0 | -0.07034 | 0 | 0 | -0.06435 | 0 | 0 | -0.05799 | 0 | 0 | -0.05101 | 0 | 0 | -0.04207 |
| 0.166808 | -0.00917 | 0 | 0.158456 | -0.01197 | 0 | 0.148252 | -0.01372 | 0 | 0.136332 | -0.01476 | 0 | 0.12306 | -0.01526 | 0 | 0.108938 | -0.01535 | 0 | 0.09451 | -0.01511 | 0 | 0.080282 | -0.01463 | 0 | 0.066677 | -0.01396 | 0 | 0.054011 | -0.01315 | 0 | 0.04249 | -0.01224 | 0 | 0.032223 | -0.01128 | 0 | 0.023235 | -0.01028 | 0 | 0.015487 | -0.00928 | 0 | 0.008882 | -0.00827 | 0 | 0.003252 | -0.00726 | 0 | -0.00197 | -0.00624 | 0 |
| -0.01603 | -0.09528 | -0.12424 | -0.01225 | -0.09119 | -0.12033 | -0.00852 | -0.08649 | -0.11438 | -0.0047 | -0.08117 | -0.10671 | -0.00084 | -0.07532 | -0.0977 | 0.002963 | -0.0691 | -0.0878 | 0.006571 | -0.06269 | -0.07746 | 0.009863 | -0.05628 | -0.06708 | 0.012739 | -0.05003 | -0.05699 | 0.015131 | -0.04404 | -0.04748 | 0.017002 | -0.03841 | -0.0387 | 0.01834 | -0.03317 | -0.03076 | 0.019152 | -0.02833 | -0.0237 | 0.019452 | -0.02386 | -0.01751 | 0.019245 | -0.0197 | -0.01213 | 0.0185 | -0.01568 | -0.00744 | 0.016958 | -0.01116 | -0.00302 |
| 0 | 0 | -0.1119 | 0 | 0 | -0.11146 | 0 | 0 | -0.11012 | 0 | 0 | -0.108 | 0 | 0 | -0.1052 | 0 | 0 | -0.10179 | 0 | 0 | -0.09785 | 0 | 0 | -0.09345 | 0 | 0 | -0.08869 | 0 | 0 | -0.08362 | 0 | 0 | -0.07831 | 0 | 0 | -0.07281 | 0 | 0 | -0.06712 | 0 | 0 | -0.06123 | 0 | 0 | -0.05506 | 0 | 0 | -0.04832 | 0 | 0 | -0.03976 |
| 0.167285 | -0.00907 | 0 | 0.158923 | -0.0119 | 0 | 0.148707 | -0.01367 | 0 | 0.136775 | -0.01473 | 0 | 0.123493 | -0.01525 | 0 | 0.109365 | -0.01535 | 0 | 0.094933 | -0.01513 | 0 | 0.080707 | -0.01466 | 0 | 0.067108 | -0.014 | 0 | 0.054453 | -0.0132 | 0 | 0.042952 | -0.01231 | 0 | 0.032714 | -0.01136 | 0 | 0.023771 | -0.01038 | 0 | 0.016091 | -0.0094 | 0 | 0.009597 | -0.00842 | 0 | 0.004181 | -0.00745 | 0 | -0.00032 | -0.00651 | 0 | -0.00434 | -0.00558 | 0 |
| -0.01577 | -0.09594 | -0.12451 | -0.01197 | -0.09185 | -0.12061 | -0.00821 | -0.08716 | -0.11467 | -0.00436 | -0.08184 | -0.107 | -0.00048 | -0.076 | -0.098 | 0.003344 | -0.06978 | -0.08811 | 0.006976 | -0.06339 | -0.07777 | 0.010294 | -0.05699 | -0.0674 | 0.013201 | -0.05076 | -0.05733 | 0.015628 | -0.04481 | -0.04783 | 0.017541 | -0.03923 | -0.03907 | 0.018931 | -0.03405 | -0.03117 | 0.019809 | -0.0293 | -0.02415 | 0.020198 | -0.02495 | -0.01803 | 0.02012 | -0.02097 | -0.01274 | 0.019585 | -0.01728 | -0.00823 | 0.018559 | -0.01374 | -0.00438 | 0.016763 | -0.00976 | -0.00088 |
| 0 | 0 | -0.11321 | 0 | 0 | -0.11281 | 0 | 0 | -0.1115 | 0 | 0 | -0.10942 | 0 | 0 | -0.10666 | 0 | 0 | -0.10329 | 0 | 0 | -0.0994 | 0 | 0 | -0.09507 | 0 | 0 | -0.09038 | 0 | 0 | -0.08541 | 0 | 0 | -0.08023 | 0 | 0 | -0.07488 | 0 | 0 | -0.06941 | 0 | 0 | -0.06382 | 0 | 0 | -0.05809 | 0 | 0 | -0.05213 | 0 | 0 | -0.04567 | 0 | 0 | -0.0375 |
| 0.167614 | -0.00897 | 0 | 0.159241 | -0.01182 | 0 | 0.149014 | -0.01362 | 0 | 0.137071 | -0.01469 | 0 | 0.123779 | -0.01522 | 0 | 0.109643 | -0.01533 | 0 | 0.095205 | -0.01512 | 0 | 0.080975 | -0.01466 | 0 | 0.067375 | -0.01401 | 0 | 0.054723 | -0.01323 | 0 | 0.043228 | -0.01235 | 0 | 0.033001 | -0.01141 | 0 | 0.024076 | -0.01044 | 0 | 0.016423 | -0.00947 | 0 | 0.009972 | -0.00851 | 0 | 0.004627 | -0.00757 | 0 | 0.000273 | -0.00666 | 0 | -0.00323 | -0.00578 | 0 | -0.00621 | -0.00494 | 0 |
| -0.01551 | -0.0965 | -0.12468 | -0.01169 | -0.09241 | -0.12079 | -0.0079 | -0.08772 | -0.11484 | -0.00404 | -0.0824 | -0.10718 | -0.00014 | -0.07656 | -0.09818 | 0.003705 | -0.07035 | -0.08829 | 0.007359 | -0.06396 | -0.07796 | 0.010701 | -0.05759 | -0.06759 | 0.013633 | -0.05137 | -0.05753 | 0.016091 | -0.04545 | -0.04804 | 0.018039 | -0.03989 | -0.03929 | 0.019472 | -0.03476 | -0.0314 | 0.020404 | -0.03007 | -0.02441 | 0.020861 | -0.0258 | -0.01831 | 0.020875 | -0.02193 | -0.01307 | 0.020474 | -0.01841 | -0.00863 | 0.019667 | -0.01516 | -0.0049 | 0.018416 | -0.01205 | -0.00181 | 0.016427 | -0.00855 | 0.000899 |
| 0 | 0 | -0.11435 | 0 | 0 | -0.11399 | 0 | 0 | -0.11272 | 0 | 0 | -0.11067 | 0 | 0 | -0.10794 | 0 | 0 | -0.10461 | 0 | 0 | -0.10076 | 0 | 0 | -0.09648 | 0 | 0 | -0.09186 | 0 | 0 | -0.08696 | 0 | 0 | -0.08188 | 0 | 0 | -0.07666 | 0 | 0 | -0.07134 | 0 | 0 | -0.06596 | 0 | 0 | -0.06051 | 0 | 0 | -0.05497 | 0 | 0 | -0.04925 | 0 | 0 | -0.04308 | 0 | 0 | -0.03532 |
| 0.167828 | -0.00888 | 0 | 0.159446 | -0.01174 | 0 | 0.149208 | -0.01355 | 0 | 0.137255 | -0.01463 | 0 | 0.123953 | -0.01518 | 0 | 0.109808 | -0.0153 | 0 | 0.095363 | -0.0151 | 0 | 0.081126 | -0.01465 | 0 | 0.067522 | -0.01401 | 0 | 0.054866 | -0.01323 | 0 | 0.04337 | -0.01236 | 0 | 0.033144 | -0.01143 | 0 | 0.024222 | -0.01047 | 0 | 0.016575 | -0.00951 | 0 | 0.010137 | -0.00856 | 0 | 0.004813 | -0.00763 | 0 | 0.000497 | -0.00674 | 0 | -0.00292 | -0.00589 | 0 | -0.00556 | -0.00509 | 0 | -0.00765 | -0.00433 | 0 |
| -0.01527 | -0.09696 | -0.12476 | -0.01142 | -0.09288 | -0.12087 | -0.00762 | -0.08819 | -0.11493 | -0.00374 | -0.08288 | -0.10727 | 0.000184 | -0.07704 | -0.09828 | 0.004045 | -0.07083 | -0.08839 | 0.007717 | -0.06445 | -0.07805 | 0.011079 | -0.05808 | -0.06769 | 0.014034 | -0.05188 | -0.05763 | 0.016518 | -0.04598 | -0.04814 | 0.018496 | -0.04045 | -0.0394 | 0.019965 | -0.03534 | -0.03152 | 0.02094 | -0.03069 | -0.02453 | 0.021451 | -0.02647 | -0.01845 | 0.021535 | -0.02267 | -0.01322 | 0.021228 | -0.01925 | -0.0088 | 0.020557 | -0.01615 | -0.00512 | 0.019531 | -0.01331 | -0.0021 | 0.018107 | -0.01058 | 0.000337 | 0.015981 | -0.00751 | 0.002354 |
| 0 | 0 | -0.11536 | 0 | 0 | -0.11504 | 0 | 0 | -0.11379 | 0 | 0 | -0.11177 | 0 | 0 | -0.10907 | 0 | 0 | -0.10577 | 0 | 0 | -0.10195 | 0 | 0 | -0.09772 | 0 | 0 | -0.09314 | 0 | 0 | -0.08831 | 0 | 0 | -0.0833 | 0 | 0 | -0.07818 | 0 | 0 | -0.07298 | 0 | 0 | -0.06775 | 0 | 0 | -0.0625 | 0 | 0 | -0.05723 | 0 | 0 | -0.05191 | 0 | 0 | -0.04643 | 0 | 0 | -0.04057 | 0 | 0 | -0.03323 |

**Table 6.** Type B rosette, ASTM E837–13a, $D = 5.13$ mm, $G_L = 1.59$ mm, $G_W = 1.14$ mm, $D_0 = 2.0$ mm, $\Delta Z = 0.05$ mm, coefficients of the derivative matrix $\bar{\alpha}_{e1}$.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.082287 | -0.01086 | 0 |
| 0.003494 | 0.046918 | 0.06574 |
| 0 | 0 | -0.06129 |
| 0.099852 | -0.01165 | 0 | 0.088069 | -0.01222 | 0 |
| 0.005904 | 0.056345 | 0.078681 | 0.002997 | 0.050539 | 0.070782 |
| 0 | 0 | -0.07118 | 0 | 0 | -0.0671 |
| 0.114833 | -0.0124 | 0 | 0.105272 | -0.01345 | 0 | 0.088899 | -0.0133 | 0 |
| 0.007884 | 0.064405 | 0.089776 | 0.005071 | 0.059739 | 0.083778 | 0.001602 | 0.051771 | 0.07213 |
| 0 | 0 | -0.07976 | 0 | 0 | -0.07715 | 0 | 0 | -0.07081 |
| 0.128107 | -0.01315 | 0 | 0.118883 | -0.0145 | 0 | 0.105982 | -0.01483 | 0 | 0.086107 | -0.0141 | 0 |
| 0.009528 | 0.071601 | 0.099665 | 0.006572 | 0.067097 | 0.094124 | 0.003399 | 0.060947 | 0.085262 | -0.00044 | 0.051284 | 0.070741 |
| 0 | 0 | -0.08759 | 0 | 0 | -0.08541 | 0 | 0 | -0.08122 | 0 | 0 | -0.07302 |
| 0.13975 | -0.01386 | 0 | 0.13057 | -0.01548 | 0 | 0.118527 | -0.01607 | 0 | 0.102801 | -0.01584 | 0 | 0.080623 | -0.01464 | 0 |
| 0.010841 | 0.078 | 0.108381 | 0.007722 | 0.073506 | 0.103057 | 0.004513 | 0.067813 | 0.094986 | 0.001042 | 0.060359 | 0.083742 | -0.00291 | 0.049512 | 0.067262 |
| 0 | 0 | -0.09476 | 0 | 0 | -0.09283 | 0 | 0 | -0.08933 | 0 | 0 | -0.08373 | 0 | 0 | -0.07401 |
| 0.149805 | -0.01451 | 0 | 0.140594 | -0.01636 | 0 | 0.128876 | -0.01716 | 0 | 0.11431 | -0.01717 | 0 | 0.096591 | -0.01648 | 0 | 0.07326 | -0.01491 | 0 |
| 0.011838 | 0.083642 | 0.115937 | 0.008563 | 0.079117 | 0.110755 | 0.005263 | 0.0736 | 0.103059 | 0.001805 | 0.066784 | 0.092801 | -0.00178 | 0.058359 | 0.07983 | -0.00559 | 0.046815 | 0.062267 |
| 0 | 0 | -0.10131 | 0 | 0 | -0.09956 | 0 | 0 | -0.09644 | 0 | 0 | -0.09171 | 0 | 0 | -0.08491 | 0 | 0 | -0.074 |
| 0.158351 | -0.01508 | 0 | 0.149095 | -0.01714 | 0 | 0.137505 | -0.01811 | 0 | 0.123445 | -0.01829 | 0 | 0.107025 | -0.01783 | 0 | 0.088206 | -0.01678 | 0 | 0.064748 | -0.01493 | 0 |
| 0.012542 | 0.088566 | 0.122373 | 0.009127 | 0.084005 | 0.117304 | 0.005725 | 0.078558 | 0.109821 | 0.002213 | 0.072031 | 0.100043 | -0.00135 | 0.064344 | 0.088146 | -0.00486 | 0.055315 | 0.074136 | -0.0083 | 0.043508 | 0.056278 |
| 0 | 0 | -0.10726 | 0 | 0 | -0.10566 | 0 | 0 | -0.10278 | 0 | 0 | -0.09854 | 0 | 0 | -0.09274 | 0 | 0 | -0.08496 | 0 | 0 | -0.07316 |
| 0.1655 | -0.01557 | 0 | 0.156202 | -0.01781 | 0 | 0.144659 | -0.01892 | 0 | 0.130844 | -0.01924 | 0 | 0.115019 | -0.01894 | 0 | 0.097529 | -0.0181 | 0 | 0.078451 | -0.01676 | 0 | 0.055716 | -0.01471 | 0 |
| 0.01299 | 0.092824 | 0.127762 | 0.00945 | 0.088232 | 0.122792 | 0.005948 | 0.082812 | 0.115447 | 0.002365 | 0.076432 | 0.105939 | -0.00124 | 0.0691 | 0.09457 | -0.00474 | 0.060851 | 0.081649 | -0.00797 | 0.051562 | 0.06725 | -0.01087 | 0.039861 | 0.049757 |
| 0 | 0 | -0.11264 | 0 | 0 | -0.11117 | 0 | 0 | -0.10847 | 0 | 0 | -0.10454 | 0 | 0 | -0.0993 | 0 | 0 | -0.0926 | 0 | 0 | -0.08407 | 0 | 0 | -0.07166 |
| 0.171393 | -0.01596 | 0 | 0.162061 | -0.01836 | 0 | 0.150527 | -0.01961 | 0 | 0.136834 | -0.02004 | 0 | 0.121316 | -0.01985 | 0 | 0.104447 | -0.01915 | 0 | 0.086657 | -0.01801 | 0 | 0.068038 | -0.01647 | 0 | 0.046673 | -0.0143 | 0 |
| 0.013219 | 0.096478 | 0.132202 | 0.009569 | 0.09186 | 0.127319 | 0.005976 | 0.086449 | 0.120073 | 0.002318 | 0.080149 | 0.110732 | -0.00135 | 0.07301 | 0.09966 | -0.00489 | 0.065148 | 0.087274 | -0.00814 | 0.056647 | 0.073927 | -0.01095 | 0.047401 | 0.059701 | -0.01319 | 0.036092 | 0.043085 |
| 0 | 0 | -0.11748 | 0 | 0 | -0.11612 | 0 | 0 | -0.11356 | 0 | 0 | -0.10985 | 0 | 0 | -0.10496 | 0 | 0 | -0.09888 | 0 | 0 | -0.09149 | 0 | 0 | -0.08241 | 0 | 0 | -0.06963 |
| 0.176183 | -0.01627 | 0 | 0.166825 | -0.01881 | 0 | 0.155286 | -0.02016 | 0 | 0.141652 | -0.02069 | 0 | 0.126298 | -0.02059 | 0 | 0.109756 | -0.01999 | 0 | 0.09257 | -0.01898 | 0 | 0.075152 | -0.01763 | 0 | 0.057555 | -0.01595 | 0 | 0.038 | -0.01373 | 0 |
| 0.013271 | 0.099592 | 0.135805 | 0.009525 | 0.094956 | 0.130999 | 0.005849 | 0.089545 | 0.123826 | 0.002121 | 0.08329 | 0.114596 | -0.00161 | 0.076265 | 0.103705 | -0.0052 | 0.06862 | 0.09162 | -0.00851 | 0.060514 | 0.078788 | -0.01137 | 0.052038 | 0.065544 | -0.01365 | 0.043078 | 0.051934 | -0.01519 | 0.03237 | 0.036558 |
| 0 | 0 | -0.1218 | 0 | 0 | -0.12055 | 0 | 0 | -0.11811 | 0 | 0 | -0.11456 | 0 | 0 | -0.10992 | 0 | 0 | -0.10423 | 0 | 0 | -0.09747 | 0 | 0 | -0.08956 | 0 | 0 | -0.08014 | 0 | 0 | -0.0672 |
| 0.180027 | -0.01651 | 0 | 0.170648 | -0.01916 | 0 | 0.159097 | -0.0206 | 0 | 0.145489 | -0.02122 | 0 | 0.130224 | -0.02119 | 0 | 0.113863 | -0.02067 | 0 | 0.096997 | -0.01975 | 0 | 0.08014 | -0.01851 | 0 | 0.063627 | -0.017 | 0 | 0.047445 | -0.01524 | 0 | 0.029959 | -0.01303 | 0 |
| 0.013184 | 0.10223 | 0.138686 | 0.009354 | 0.097582 | 0.133947 | 0.005606 | 0.09217 | 0.126831 | 0.001812 | 0.085941 | 0.117677 | -0.00198 | 0.078985 | 0.106902 | -0.00563 | 0.071473 | 0.094999 | -0.009 | 0.063594 | 0.082455 | -0.01194 | 0.055506 | 0.069688 | -0.01431 | 0.047281 | 0.056971 | -0.016 | 0.038785 | 0.0443 | -0.01682 | 0.028814 | 0.030386 |
| 0 | 0 | -0.12565 | 0 | 0 | -0.1245 | 0 | 0 | -0.12216 | 0 | 0 | -0.11874 | 0 | 0 | -0.11429 | 0 | 0 | -0.10886 | 0 | 0 | -0.10251 | 0 | 0 | -0.09525 | 0 | 0 | -0.087 | 0 | 0 | -0.0774 | 0 | 0 | -0.06449 |
| 0.183073 | -0.01667 | 0 | 0.173678 | -0.01942 | 0 | 0.162112 | -0.02095 | 0 | 0.148513 | -0.02163 | 0 | 0.133294 | -0.02167 | 0 | 0.117034 | -0.0212 | 0 | 0.100348 | -0.02035 | 0 | 0.083788 | -0.01918 | 0 | 0.067778 | -0.01778 | 0 | 0.05255 | -0.01619 | 0 | 0.038021 | -0.0144 | 0 | 0.022706 | -0.01224 | 0 |
| 0.012993 | 0.104457 | 0.140956 | 0.009091 | 0.099802 | 0.136274 | 0.005278 | 0.094387 | 0.129204 | 0.001426 | 0.088174 | 0.120104 | -0.00242 | 0.081262 | 0.109406 | -0.00613 | 0.073834 | 0.097618 | -0.00956 | 0.066095 | 0.085247 | -0.01256 | 0.058232 | 0.072744 | -0.01502 | 0.050379 | 0.060456 | -0.01685 | 0.042574 | 0.048576 | -0.01794 | 0.034662 | 0.03705 | -0.01808 | 0.025503 | 0.024704 |
| 0 | 0 | -0.12906 | 0 | 0 | -0.12801 | 0 | 0 | -0.12576 | 0 | 0 | -0.12244 | 0 | 0 | -0.11813 | 0 | 0 | -0.1129 | 0 | 0 | -0.10683 | 0 | 0 | -0.09998 | 0 | 0 | -0.09239 | 0 | 0 | -0.08395 | 0 | 0 | -0.07433 | 0 | 0 | -0.0616 |
| 0.185457 | -0.01678 | 0 | 0.17605 | -0.01961 | 0 | 0.164469 | -0.0212 | 0 | 0.150868 | -0.02194 | 0 | 0.135672 | -0.02203 | 0 | 0.119467 | -0.02162 | 0 | 0.102882 | -0.02081 | 0 | 0.086488 | -0.01971 | 0 | 0.070742 | -0.01838 | 0 | 0.055952 | -0.01687 | 0 | 0.042243 | -0.01524 | 0 | 0.029472 | -0.01346 | 0 | 0.016315 | -0.01139 | 0 |
| 0.012729 | 0.106329 | 0.142719 | 0.008763 | 0.101671 | 0.138085 | 0.004894 | 0.096255 | 0.131051 | 0.000991 | 0.090052 | 0.12199 | -0.0029 | 0.083169 | 0.111345 | -0.00666 | 0.075796 | 0.099631 | -0.01015 | 0.068147 | 0.087368 | -0.01322 | 0.060425 | 0.075022 | -0.01576 | 0.052789 | 0.062969 | -0.01769 | 0.045334 | 0.051466 | -0.01895 | 0.038062 | 0.040627 | -0.01946 | 0.030801 | 0.030349 | -0.01898 | 0.02248 | 0.019587 |
| 0 | 0 | -0.13208 | 0 | 0 | -0.13111 | 0 | 0 | -0.12894 | 0 | 0 | -0.12571 | 0 | 0 | -0.1215 | 0 | 0 | -0.11642 | 0 | 0 | -0.11056 | 0 | 0 | -0.10401 | 0 | 0 | -0.09683 | 0 | 0 | -0.08904 | 0 | 0 | -0.08055 | 0 | 0 | -0.07103 | 0 | 0 | -0.0586 |
| 0.187301 | -0.01685 | 0 | 0.177882 | -0.01974 | 0 | 0.166287 | -0.02139 | 0 | 0.15268 | -0.02218 | 0 | 0.137491 | -0.02231 | 0 | 0.121316 | -0.02193 | 0 | 0.104787 | -0.02117 | 0 | 0.088487 | -0.02011 | 0 | 0.072888 | -0.01883 | 0 | 0.058324 | -0.01739 | 0 | 0.044985 | -0.01583 | 0 | 0.032905 | -0.01419 | 0 | 0.021894 | -0.01247 | 0 | 0.010795 | -0.0105 | 0 |
| 0.012417 | 0.1079 | 0.144067 | 0.008396 | 0.103243 | 0.139472 | 0.004478 | 0.097826 | 0.132468 | 0.000529 | 0.09163 | 0.123436 | -0.00341 | 0.084767 | 0.112827 | -0.00721 | 0.077431 | 0.101162 | -0.01075 | 0.069843 | 0.088967 | -0.01387 | 0.062213 | 0.076718 | -0.01648 | 0.054713 | 0.064803 | -0.0185 | 0.047462 | 0.053504 | -0.01988 | 0.040515 | 0.042987 | -0.02059 | 0.033842 | 0.033294 | -0.02057 | 0.027255 | 0.024292 | -0.01954 | 0.019762 | 0.015061 |
| 0 | 0 | -0.13474 | 0 | 0 | -0.13385 | 0 | 0 | -0.13175 | 0 | 0 | -0.12859 | 0 | 0 | -0.12448 | 0 | 0 | -0.11951 | 0 | 0 | -0.1138 | 0 | 0 | -0.10746 | 0 | 0 | -0.10057 | 0 | 0 | -0.09319 | 0 | 0 | -0.08534 | 0 | 0 | -0.07692 | 0 | 0 | -0.06759 | 0 | 0 | -0.05556 |
| 0.188708 | -0.01688 | 0 | 0.179279 | -0.01982 | 0 | 0.167671 | -0.02152 | 0 | 0.154054 | -0.02234 | 0 | 0.138865 | -0.02251 | 0 | 0.122703 | -0.02217 | 0 | 0.106204 | -0.02144 | 0 | 0.089956 | -0.02041 | 0 | 0.074439 | -0.01916 | 0 | 0.059999 | -0.01777 | 0 | 0.046849 | -0.01627 | 0 | 0.035073 | -0.01471 | 0 | 0.024629 | -0.0131 | 0 | 0.015309 | -0.01145 | 0 | 0.006115 | -0.00961 | 0 |
| 0.012077 | 0.109217 | 0.145081 | 0.008007 | 0.104561 | 0.140518 | 0.004047 | 0.099145 | 0.133536 | 5.86E-05 | 0.092954 | 0.124525 | -0.00392 | 0.086105 | 0.113941 | -0.00776 | 0.078795 | 0.102309 | -0.01134 | 0.071249 | 0.090158 | -0.01451 | 0.063681 | 0.077969 | -0.01718 | 0.056272 | 0.066138 | -0.01927 | 0.04915 | 0.054957 | -0.02075 | 0.042394 | 0.044612 | -0.02159 | 0.036018 | 0.035189 | -0.02179 | 0.029967 | 0.026675 | -0.0213 | 0.024051 | 0.018916 | -0.01981 | 0.017349 | 0.01112 |
| 0 | 0 | -0.13708 | 0 | 0 | -0.13626 | 0 | 0 | -0.13422 | 0 | 0 | -0.13113 | 0 | 0 | -0.12709 | 0 | 0 | -0.12222 | 0 | 0 | -0.11663 | 0 | 0 | -0.11044 | 0 | 0 | -0.10376 | 0 | 0 | -0.09667 | 0 | 0 | -0.08922 | 0 | 0 | -0.08142 | 0 | 0 | -0.07316 | 0 | 0 | -0.06411 | 0 | 0 | -0.05253 |
| 0.189767 | -0.01687 | 0 | 0.180328 | -0.01987 | 0 | 0.168707 | -0.0216 | 0 | 0.155079 | -0.02246 | 0 | 0.139886 | -0.02265 | 0 | 0.123727 | -0.02234 | 0 | 0.107243 | -0.02163 | 0 | 0.091022 | -0.02063 | 0 | 0.075549 | -0.01941 | 0 | 0.061177 | -0.01805 | 0 | 0.048127 | -0.01659 | 0 | 0.036502 | -0.01507 | 0 | 0.026303 | -0.01354 | 0 | 0.017436 | -0.01199 | 0 | 0.009685 | -0.01042 | 0 | 0.002215 | -0.00872 | 0 |
| 0.011724 | 0.110319 | 0.145828 | 0.007613 | 0.105667 | 0.141289 | 0.003615 | 0.100253 | 0.134325 | -0.00041 | 0.094066 | 0.12533 | -0.00442 | 0.087227 | 0.114763 | -0.0083 | 0.079935 | 0.103152 | -0.01191 | 0.072418 | 0.09103 | -0.01513 | 0.064894 | 0.078879 | -0.01785 | 0.057546 | 0.0671 | -0.02 | 0.050511 | 0.055988 | -0.02155 | 0.043875 | 0.045741 | -0.0225 | 0.037674 | 0.036459 | -0.02285 | 0.031896 | 0.028166 | -0.02259 | 0.026464 | 0.020805 | -0.02169 | 0.021189 | 0.014217 | -0.01982 | 0.015227 | 0.007735 |
| 0 | 0 | -0.13914 | 0 | 0 | -0.13838 | 0 | 0 | -0.13639 | 0 | 0 | -0.13336 | 0 | 0 | -0.12938 | 0 | 0 | -0.12458 | 0 | 0 | -0.11909 | 0 | 0 | -0.11302 | 0 | 0 | -0.1065 | 0 | 0 | -0.09962 | 0 | 0 | -0.09245 | 0 | 0 | -0.08504 | 0 | 0 | -0.07737 | 0 | 0 | -0.06934 | 0 | 0 | -0.06062 | 0 | 0 | -0.04955 |
| 0.190549 | -0.01685 | 0 | 0.181101 | -0.01988 | 0 | 0.169468 | -0.02164 | 0 | 0.155829 | -0.02253 | 0 | 0.140629 | -0.02275 | 0 | 0.124468 | -0.02246 | 0 | 0.107988 | -0.02177 | 0 | 0.09178 | -0.02079 | 0 | 0.076329 | -0.01959 | 0 | 0.061993 | -0.01825 | 0 | 0.048996 | -0.01682 | 0 | 0.037449 | -0.01534 | 0 | 0.027366 | -0.01384 | 0 | 0.018688 | -0.01236 | 0 | 0.011289 | -0.01089 | 0 | 0.004961 | -0.00942 | 0 | -0.00098 | -0.00786 | 0 |
| 0.011371 | 0.111243 | 0.146364 | 0.007224 | 0.106594 | 0.141845 | 0.003193 | 0.101182 | 0.134894 | -0.00086 | 0.094999 | 0.12591 | -0.0049 | 0.088168 | 0.115355 | -0.00881 | 0.080889 | 0.103758 | -0.01246 | 0.073394 | 0.091654 | -0.01571 | 0.0659 | 0.079527 | -0.01847 | 0.058595 | 0.067779 | -0.02067 | 0.051619 | 0.056709 | -0.02229 | 0.045064 | 0.046519 | -0.02332 | 0.038975 | 0.037315 | -0.02377 | 0.033356 | 0.029134 | -0.02367 | 0.028171 | 0.02195 | -0.02303 | 0.023333 | 0.015679 | -0.02179 | 0.018657 | 0.010166 | -0.01962 | 0.013376 | 0.004863 |
| 0 | 0 | -0.14094 | 0 | 0 | -0.14024 | 0 | 0 | -0.1383 | 0 | 0 | -0.13531 | 0 | 0 | -0.13139 | 0 | 0 | -0.12666 | 0 | 0 | -0.12124 | 0 | 0 | -0.11527 | 0 | 0 | -0.10887 | 0 | 0 | -0.10214 | 0 | 0 | -0.09517 | 0 | 0 | -0.08803 | 0 | 0 | -0.08074 | 0 | 0 | -0.07328 | 0 | 0 | -0.06554 | 0 | 0 | -0.05719 | 0 | 0 | -0.04665 |
| 0.191115 | -0.01681 | 0 | 0.181658 | -0.01987 | 0 | 0.170014 | -0.02166 | 0 | 0.156364 | -0.02256 | 0 | 0.141155 | -0.02281 | 0 | 0.124989 | -0.02253 | 0 | 0.108507 | -0.02186 | 0 | 0.092303 | -0.0209 | 0 | 0.076862 | -0.01972 | 0 | 0.062542 | -0.0184 | 0 | 0.049572 | -0.01698 | 0 | 0.038064 | -0.01553 | 0 | 0.028037 | -0.01406 | 0 | 0.019444 | -0.01261 | 0 | 0.012184 | -0.01119 | 0 | 0.006119 | -0.00981 | 0 | 0.001054 | -0.00844 | 0 | -0.00355 | -0.00703 | 0 |
| 0.011026 | 0.112016 | 0.146737 | 0.006847 | 0.107372 | 0.142232 | 0.002789 | 0.101962 | 0.135291 | -0.00129 | 0.095783 | 0.126315 | -0.00536 | 0.088957 | 0.115768 | -0.0093 | 0.081689 | 0.104179 | -0.01297 | 0.074209 | 0.092086 | -0.01626 | 0.066738 | 0.079973 | -0.01905 | 0.059464 | 0.068244 | -0.0213 | 0.05253 | 0.057199 | -0.02296 | 0.04603 | 0.047041 | -0.02405 | 0.040016 | 0.037882 | -0.02459 | 0.0345 | 0.029761 | -0.0246 | 0.029459 | 0.022663 | -0.02412 | 0.024843 | 0.016527 | -0.02315 | 0.02056 | 0.01126 | -0.02165 | 0.016434 | 0.006715 | -0.01925 | 0.011771 | 0.002454 |
| 0 | 0 | -0.14252 | 0 | 0 | -0.14187 | 0 | 0 | -0.13998 | 0 | 0 | -0.13703 | 0 | 0 | -0.13315 | 0 | 0 | -0.12847 | 0 | 0 | -0.12312 | 0 | 0 | -0.11722 | 0 | 0 | -0.11091 | 0 | 0 | -0.1043 | 0 | 0 | -0.09749 | 0 | 0 | -0.09055 | 0 | 0 | -0.08352 | 0 | 0 | -0.07642 | 0 | 0 | -0.06922 | 0 | 0 | -0.0618 | 0 | 0 | -0.05384 | 0 | 0 | -0.04386 |
| 0.191514 | -0.01676 | 0 | 0.182047 | -0.01984 | 0 | 0.170392 | -0.02165 | 0 | 0.156733 | -0.02258 | 0 | 0.141514 | -0.02283 | 0 | 0.125341 | -0.02257 | 0 | 0.108854 | -0.02192 | 0 | 0.092649 | -0.02097 | 0 | 0.077209 | -0.0198 | 0 | 0.062895 | -0.01849 | 0 | 0.049936 | -0.01709 | 0 | 0.038444 | -0.01565 | 0 | 0.028444 | -0.01421 | 0 | 0.019889 | -0.01278 | 0 | 0.012686 | -0.0114 | 0 | 0.006716 | -0.01006 | 0 | 0.001836 | -0.00877 | 0 | -0.00213 | -0.00751 | 0 | -0.00558 | -0.00623 | 0 |
| 0.010696 | 0.112664 | 0.146983 | 0.006488 | 0.108025 | 0.142489 | 0.002405 | 0.102618 | 0.135555 | -0.0017 | 0.096442 | 0.126584 | -0.00579 | 0.089621 | 0.116041 | -0.00975 | 0.082361 | 0.104458 | -0.01345 | 0.074892 | 0.092371 | -0.01676 | 0.067438 | 0.080267 | -0.01959 | 0.060186 | 0.068548 | -0.02187 | 0.053282 | 0.057517 | -0.02358 | 0.046823 | 0.047377 | -0.02472 | 0.04086 | 0.038242 | -0.02532 | 0.035412 | 0.030153 | -0.02542 | 0.030465 | 0.023099 | -0.02505 | 0.025979 | 0.017027 | -0.02424 | 0.021896 | 0.011859 | -0.02301 | 0.018123 | 0.007497 | -0.0213 | 0.014494 | 0.003809 | -0.01874 | 0.010386 | 0.000457 |
| 0 | 0 | -0.1439 | 0 | 0 | -0.1433 | 0 | 0 | -0.14145 | 0 | 0 | -0.13854 | 0 | 0 | -0.1347 | 0 | 0 | -0.13006 | 0 | 0 | -0.12476 | 0 | 0 | -0.11892 | 0 | 0 | -0.11269 | 0 | 0 | -0.10618 | 0 | 0 | -0.09948 | 0 | 0 | -0.09268 | 0 | 0 | -0.08584 | 0 | 0 | -0.07899 | 0 | 0 | -0.07214 | 0 | 0 | -0.06523 | 0 | 0 | -0.05816 | 0 | 0 | -0.05061 | 0 | 0 | -0.04118 |
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| 0.010383 | 0.113207 | 0.147133 | 0.006151 | 0.108573 | 0.142646 | 0.002047 | 0.10317 | 0.135716 | -0.00208 | 0.096996 | 0.126748 | -0.00619 | 0.09018 | 0.116209 | -0.01017 | 0.082925 | 0.104629 | -0.01389 | 0.075466 | 0.092545 | -0.01722 | 0.068024 | 0.080445 | -0.02008 | 0.060789 | 0.068731 | -0.02239 | 0.053907 | 0.057708 | -0.02413 | 0.047476 | 0.047577 | -0.02532 | 0.041551 | 0.038453 | -0.02597 | 0.036151 | 0.030381 | -0.02613 | 0.031266 | 0.023349 | -0.02585 | 0.026865 | 0.017306 | -0.02516 | 0.022899 | 0.012181 | -0.02409 | 0.019305 | 0.007887 | -0.02266 | 0.015992 | 0.004327 | -0.02079 | 0.012809 | 0.001387 | -0.01812 | 0.009195 | -0.00118 |
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