



DIPARTIMENTO DESTEC – GRNSPG (San Piero a Grado)  
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# NUCLEAR THERMAL-HYDRAULICS: DATABASE → APPLICATIONS

**F. D'Auria**

Track 8: Data, Data Science, and Data-Driven Thermal-  
Hydraulics – Panel – Sept. 2

*Session Organizer: Nam T. Dinh (NCSU)*

## NURETH-16

16th International Topical Meeting on  
Nuclear Reactor Thermal Hydraulics

Aug 30-Sept 4, 2015  
Hyatt Regency  
Chicago, IL



# ANS

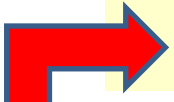
# OBJECTIVE

*The (old) idea is to connect Science and Technology.*

*The framework: the fundamental understanding and the basic research are functional for the technology of a complex system.*

**THE PROCESS FROM DATABASE TO BEPU  
... AND BEYOND**

# THE PROCESS

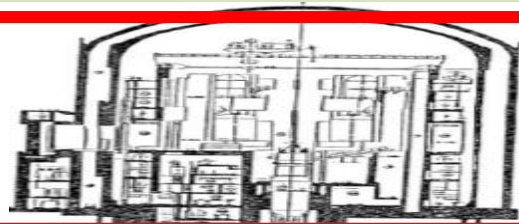


ACCIDENT ANALYSIS / FSAR – CHAPT. 15

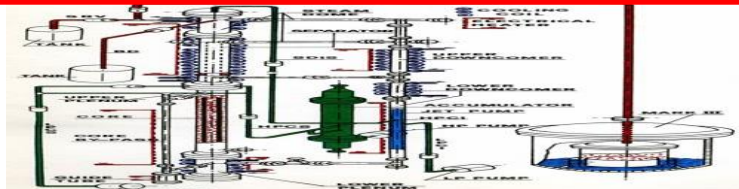
LICENSING  $\leftrightarrow$  BEPU  $\leftarrow$  Other Disciplines + PSA  
UNCERTAINTY

DATA

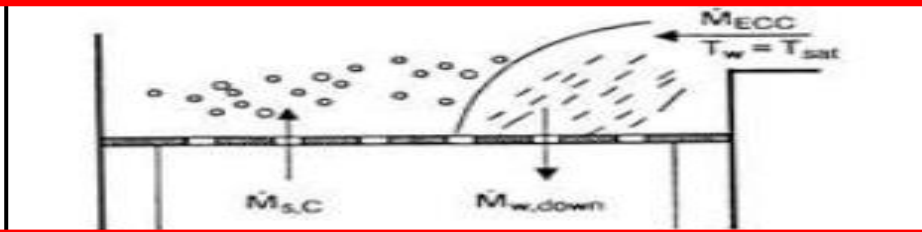
NPP



ITF



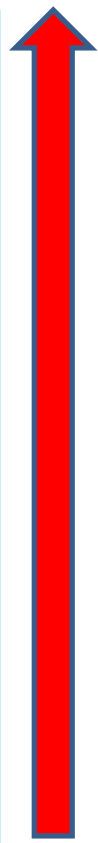
SETF



BASIC



SYS TH CODE DEVELOPMENT



V & V - SCALING

# THE DATA



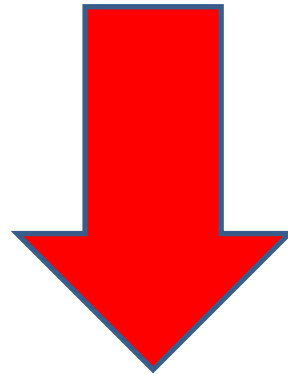
- **N\*1000 BASIC TESTS**
- **> 1000 SETF**
- **> 100 ITF**
- **N\*10 SUITABLE NPP DATA SETS**

**TH ITF & SELECTED SETF INFO**  
recently collected (RCS, CONT, SMR)

ITF constructed and operated for the simulation of RCS including advanced designs	Country where the facility is installed and Owner Institution are identified. Fifty (50) ITF are listed, Part 1 and Part 2.
ITF simulating PWR, main characteristics	Including those considered in OECD/NEA/CSNI, 1989, see also Karwat, 1985. Information from recent research programs has been added.
ITF simulating PWR, pump data	
ITF simulating PWR, core data	
ITF simulating PWR, SG data	
ITF simulating BWR, main characteristics	
ITF simulating BWR, core data	Considered in OECD/NEA/CSNI, 1989
ITF and SETF simulating VVER, main characteristics	
ITF and SETF simulating VVER, pump data	
ITF and SETF simulating VVER, core data	
ITF and SETF simulating VVER, SG data	
ITF simulating advanced PWR, main characteristics	
ITF simulating advanced PWR, pump data	
ITF simulating advanced PWR, core data	
ITF simulating advanced PWR, SG data	
Facilities constructed and operated for the simulation of CONTAINMENT including advanced designs	Country where the facility is installed and Owner Institution are identified. Twenty-three (23) facilities are listed.
CONTAINMENT facilities, main characteristics	Including those considered in OECD/NEA/CSNI, 1999
Pressure Suppression CONTAINMENT systems, comparison of selected data	Considered in OECD/NEA/CSNI, 1986
Pressure Suppression CONTAINMENT facilities, comparison of selected geometrical data	
Pressure Suppression CONTAINMENT facilities, key scaling factors	

# ... BEYOND BEPU

**TO APPLY THE [TH] BEPU TECHNOLOGY**  
(V & V – SCALING – UNCERTAINTY – CODE COUPLING – PSA ...)  
**TO ANY ANALYSIS NEEDED FOR NPP SAFETY**



**BEPU - FSAR**