

**COMPUTATIONAL MULTI-FLUID DYNAMICS MODELS FOR
MULTI-SCALE AND MULTIPHYSICS PROBLEMS IN NUCLEAR
SYSTEMS:METHODS, ALGORITHMS, CHALLENGES AND
PERSPECTIVES
TRACK NUMBER 300**

JEFF GOMES*, FRANCISCO B.S. OLIVEIRA† AND DANY S. DOMINGUEZ‡

* Mechanics of Fluids, Soils and Structures Research Group, School of Engineering, University of
Aberdeen, UK
AB24 3UE
jefferson.gomes@abdn.ac.uk,<http://alturl.com/zapk4>

† Postgraduate Programme in Computing Modeling, Exact and Technological Sciences Department,
Universidade Estadual de Santa Cruz, Rod. Jorge Amado km 16, Ilhéus, BA, Brazil
45662-900
fbrunoso@uesc.br,<http://lattes.cnpq.br/0087804302005744>

‡ Postgraduate Programme in Computing Modeling, Exact and Technological Sciences Department,
Universidade Estadual de Santa Cruz, Rod. Jorge Amado km 16, Ilhéus, BA, Brazil
45662-900
dsdominguez@uesc.br,<http://lattes.cnpq.br/1838276397621049>

Key words: CFD, Multiscale Methods, Nuclear systems, Artificial Intelligence

ABSTRACT

Computational multi-fluid models (CMFD) have become major tools in the design and optimisation of materials, equipment and processes, and in risk assessment for environmental and industrial flows. Challenges on developing accurate and reliable models are often associated with the complexity of the flow dynamics and domain geometry, multiplicity of length and time-scales of physical phenomena, inherent heterogeneous nature of multiphase fluids, anisotropy of properties and computational overhead for detailed simulations.

The main aim of this Symposium is to foster discussion and collaboration among environmental and industrial scientists and professionals on cutting-edge technologies for multiscale and multiphysics methods currently embedded in CMFD models for nuclear systems. In particular, it will cover fundamental research areas on advanced subgrid-scale FEM/FVM models for multiphysics problems.

Emphasis will be on the implementation and optimisation of computational methods and algorithms used in large scale simulations of multi-scale and multiphysics flow problems. All application areas ranging from flow dynamics in pore-scale (nuclear waste repositories) to thermo-hydraulics in nuclear systems and simulation of severe accident scenarios are welcomed.

Contributions are welcome on, but not limited to the following topics:

- Computational multi-fluid dynamics (CMFD and CFD) models;
- Coupling models for multiphysics problems;
- Parallel numerical algorithms for large scale flow simulations;
- Turbulence models;
- Reduced-order models;
- Artificial intelligence;
- CFD simulations of advanced nuclear systems;
- Analytical and semi-empirical models for single/multiphase flows in nuclear applications.