**Computational Methods for Multi-scale, Multi-uncertainty and**

**Multi-physics Problems**

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Over the past two decades, there has been a notable surge in interest surrounding the advancement of multi-physics, multi-scale and multi-uncertainty models. This surge can be attributed to the emergence of new mathematical formulations and numerical solution strategies, coupled with the escalating computational power-to-cost ratio. These factors have collectively contributed to a remarkable expansion within this dynamically evolving field.

The research landscape in this domain has focused extensively on formulating and integrating various analytical tools, such as homogenization and asymptotic analysis, alongside leveraging advanced computational methods like parallel computing, stochastic analysis, and code coupling. The application of these tools and methods spans a wide array of fields, including but not limited to metal processing, composite materials, oil and gas development, fuel cell technology, and biomedical tissue engineering. This diversification underscores the versatility and applicability of the developed models.

Significantly, these advancements have played a pivotal role in deepening our comprehension of the intricate interactions inherent in multi-physics and multi-uncertainty phenomena occurring across diverse scales in both space and time. The synergy of novel mathematical frameworks, innovative numerical approaches, and the increased efficiency of computational resources has propelled this field into a central position, fostering breakthroughs and insights across a spectrum of scientific and engineering disciplines. In the most general format, the ECCOMAS Thematic Conference CM3P targets the latest advances in the M3 fields, including the following (not exhaustive) research topics:

* Computer simulation of multi-physics processes/systems
* Computational homogenization and multi-scale modelling
* Stochastic modelling, probabilistic engineering, reliability and risk assessment
* Computational coupling strategies
* High-performance computing related to the M3 (multi-physics, multi-scale and multi-uncertainty) challenges
* Relevant scientific and industrial applications
* Other related topics

**Keywords**:

1. Presenting Author

   **References**:

   [1] A. Axyz, B. Bxyz. 2025. Title abc. Journal of xyz. Vol. 123, pp. 567-789. [↑](#footnote-ref-1)