

20th UIT Summer School 2024

1st – 7th September 2024

Title: Multiscale modelling in thermal fluid dynamics: theory and applications



Short abstract:

Explore the power of multiscale modelling! Join the 20th UIT Summer School to bridge gaps between various scales, from micro to macro. We welcome engineers, PhD students, and post-doc researchers, aiming to introduce newcomers to multiscale techniques and engage a broad audience. Dive into microstructure thermodynamics, nanoscale phenomena, and large-scale simulations. Gain essential mathematical skills and empower your research. Uncover the world of thermal and fluid dynamics with us.

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Abstract:

In the dynamic landscape of engineering and scientific research, multiscale modelling has emerged as an indispensable tool for mastering the disparate variety of thermal and fluid dynamics phenomena across varying length and time scales. The Italian Union for Thermal-Fluid Dynamics cordially invites engineers, PhD students, and post-doc researchers to our forthcoming 20th UIT Summer School, dedicated to the exploration of multiscale modelling in thermal fluid dynamics. Our aim is twofold. Firstly, we aspire to bring the invaluable insights of multiscale techniques closer to those who have not yet ventured into this domain. We believe that many individuals, although unfamiliar with multiscale approaches, possess the potential to make significant contributions in their respective fields by harnessing the power of these techniques. Secondly, our program encompasses a comprehensive spectrum of scales, ranging from micro and nano modelling to large-scale simulations. This broader perspective is intended to captivate a diverse audience, attracting the interest of engineers and researchers seeking to delve into the fascinating world of thermal and fluid dynamics at various scales. The lectures offer a comprehensive overview of the practical applications and theoretical underpinnings of multiscale modelling. Participants will delve into the captivating realm of heat and mass

transfer, spanning micro and nanoscales, as well as macroscopic phenomena. Topics will include microstructure thermodynamics, transport phenomena in advanced materials and microdevices, as well as the versatile applications of nanofluids, metal foams, and hierarchical structures in diverse energy-related contexts. Furthermore, the Summer School will provide a solid foundation in essential mathematical concepts, including model reduction, coarse-graining, and machine learning-based techniques, which are pivotal for simplifying complex systems and making them computationally accessible. By bridging the realms of theory and hands-on experience, this Summer School aims to empower engineers, PhD students, and post-doc researchers with the skills and knowledge needed to navigate the intricate terrain of multiscale modelling. For those who are seeking to gain a deeper understanding of multiscale modelling in engineering, this program offers a unique opportunity for growth and discovery.

LOCATION:

The 19th Summer School will be held in the prestigious Ancient Certosa di Pontignano, a unique place where nature, history and hospitality blend together in a memorable harmony, at a few kilometers from Siena, in the heart of Chianti, on a hill dominating the town. Further information can be gathered directly at Certosa website (www.lacertosadipontignano.com).

