SIMULATING HEAT TRANSFER PHENOMENA
WITH COMSOL MULTIPHYSICS

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ABSTRACT COMSOL Multiphysics is a complete multiphysics simulation environment that can help investigate the effects of heating and cooling in devices, components, or processes. With this software, typical mechanisms of heat transfer are easy to study: conduction, convection, and radiation. A special strength is its ability to solve problems where heat transfer is coupled with any other physics, including structural mechanics, fluid dynamics, electromagnetics, and chemical reactions. In particular, it is easy to set up thermo-fluid dynamics simulations with natural and forced convection, both in laminar and turbulent regimes. Phenomena at all length scales can be modeled, from MEMS and electronics to large oven or open air. During the seminar, it will be shown the possibility of modeling also unconventional heat transfer problems such as thermal storage and management applications with phase change (solidification, melting…), automatic features for the transport of moisture both in solid and fluids, and bio-heating. It will be also explained how to build your own coupling within predefined physics or define new PDEs to describe specific phenomena. Lastly, it will be shown how models can be easily transformed into apps with intuitive user interfaces, that can be shared with colleagues or customers worldwide, delivering highly automatized solutions which can drastically improve design processes.