A COMSOL Application for Managing Computational Sequences in Thermo-Fluid-Dynamical Applications

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Abstract

A COMSOL Multiphysics® Application allows both expert and beginner users to carry out parametric simulations thanks to flexible and user-friendly customized interfaces. Many people not necessarily with expertise in numerical analysis can now access, exploit and share simulation tools. It is really a new frontier in virtual prototyping.

Going beyond the use of applications for parametric simulations (geometry, materials, boundary conditions, …) BE CAE & Test proposes a new feature based on the use of a COMSOL Application for managing computational sequences.

The investigated topic concerns an industrial cooling process for materials treatment. Very usually, it is required to simulate a transient thermal analysis in a forced permanent flow and starting from an initial thermal distribution. This kind of study can be carried out by three steps, according to different boundary conditions and physical variables coupling from one step to another: fluid dynamical solution of the permanent velocity field, stationary thermal simulation of temperature distribution at cooling process beginning, transient thermal analysis during the cooling process.

We built a COMSOL Application enabling the automatic management of the mentioned steps by two different approaches. The first one exploits the potentiality of the Application Builder, the second one is based on the methods implementation.