Suggestion of PhD subject for the CSC Program 2022

"Development of new metallic structures for highly efficient heat exchangers"

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PhD research works:

This thesis aims to develop new metallic structures for thermal components. Increasing the heat transfer between a fluid and a thermal system can help for saving energy resource, preventing undesirable thermal degradation or improving the efficiency of thermal exchangers. Such achievements foster the research of manufacturable solutions. We suggest working in that direction. The PhD works will consist in finding various efficient structures that can improve the heat transfer between an incompressible fluid flow and structures. New structures will be designed and optimized depending on the conjugate heat transfer with the fluid. Velocities and temperatures profiles, Heat transfer and friction coefficients are analyzed for each studied structure. This work includes analytical approaches to find out objective functions we can rely on for a good parameter selection. The optimization task will be coupled with a Multiphysics simulation using finite element and/or finite volume codes (Comsol and Ansys softwares), and virtual tests will be performed to identify some optimal heat transfer devices with general guidance about both heating and flow conditions for an efficient conjugate heat transfer.

This research direction implies some pre-requisites in the field of mechanical engineering. The PhD candidate is expected to work with CFD analysis, convective heat transfer, mathematical modeling and optimization methods [1–10].

Keywords:

New metal structure, heat exchanger, heat Transfer, modeling, CFD, optimization.

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