Master Thesis

Quantum Computing approaches to Computational Fluid Dynamics

Project description

We are looking for a talented student who is interested in exploring and developing Quantum Computing approaches to Computational Fluid Dynamics (CFD).

The accurate prediction of turbulent flows, for example by solving the set of Navier Stokes equations, is even nowadays a great scientific challenge and is one of the most demanding computational tasks in computer science. Flow modelling plays a key-role in many industries like avionics and aerospace that requires increasingly complex and demanding simulations at the edge and beyond the currently available computing power.

Quantum Computing (QC) is a disruptive technology that promises unprecedented computational speed-up for specific tasks exploiting superposition, interference and entanglement of quantum states. Recently, researchers have proposed quantum algorithms to simulate fluid flow with both continuous and statistical approaches. These algorithms are typical hybrid in nature, relying on both classical numerical and quantum techniques.

We propose to implement the most promising quantum CFD algorithms and test them on conceptually simple but of practical interest problems such as Couette flow or flow through de Laval nozzle. These tests will be performed by means of emulators and possibly on real quantum computers.

This thesis is in collaboration between Optimad and Links Foundation, both located in Turin (Italy).
The ideal candidate

- is enrolled in MSc, or equivalent university degree in
  - Computer Science or related
  - Computational Mechanics or related
  - Physics
- passionate about programming
- has a good approach to problem-solving
- has a proactive attitude and willingness to learn

What we offer

- you will part of a highly specialized team in Computational Fluid Dynamics and Quantum Computing
- friendly work environment

Apply for this project

Please send your CV and cover letter to
careers@optimad.it and andrea.scarabosio@linksfoundation.com

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