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# Quantum computing: a grand era for simulating fluid

*Monday, 24 October 2022 10:00 (30 minutes)*

Transport phenomena remains nowadays the most challenging unsolved problems in computational physics due to the inherent nature of Navier-Stokes equations. As the revolutionary technology, quantum computing opens a grand new perspective for numerical simulations for instance the computational fluid dynamics (CFD). In this plenary talk, starting with an overview of quantum computing including basic conceptions for instance qubits, quantum gates and circuit, more focus are then put on how to translate the algorithms from the classical computation system to quantum system. The possible quantum algorithms (e.g. partial different equation solver, eigenvalue solvers, etc.) for fluid dynamics are overviewed. Two concrete typical examples are presented with details namely: first one based on lattice Boltzmann method, the second one based on quantum Navier-Stokes algorithm. In the latter method the key process of reducing partial different equations to ordinary differential equations is explained. In the end the advantages of quantum computing are compared with the classical computation, indicating that a large application area for simulating fluid using quantum system is yet coming.

## Experiment context, if any

## References

## Significance

**Presenter:** Prof. LI, Rui (Deggendorf Institute of Technology)

**Session Classification:** Plenary