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Quantum turbulence exploration using the Gross-Pitaevskii equation[1] LUMINITA DANAILA, University of Rouen Normandy, MICHIKAZU KOBAYASHI, Kyoto University, FRANCKY LUDDENS, CORENTIN LOTHODE, University of Rouen Normandy, PHILIPPE PARNAUDEAU, University of Poitiers, IONUT DANAILA, University of Rouen Normandy, MARC BRACHET, Ecole Normale Suprieure Paris, QUTE-HPC COLLABORATION — We solve numerically the Gross-Pitaevskii (GP) equation to simulate the dynamics of Quantum Turbulence (QT) in a periodic box. This intends to model the behaviour of superfluid helium in the low-temperature regime, therefore a viscous-free flow. Simulations are performed with a spectral code solving the GP equation using MPI-OpenMP parallel programming. We assess the effect of different initial conditions on the statistical behaviour of the flow, through both spectra and structure functions. Closures for non-linear energy transfer terms are proposed and validated, mainly based on vortex reconnection mechanism. Analogies and differences between QT and classical turbulence are drawn.

Luminita Danaila
University of Rouen Normandy

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