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Simulation of 2D and 3Dcavity flow using the Lattice Boltzmann Method[1] LUBING WANG, YUEHONG QIAN, PENG ZHAO, Shanghai University, DANDAN ZHANG, Shanghai Supercomputing Center — The lid-driven cavity flow is a well-known benchmark problem for fluid simulations. Due to the simplicity of the cavity geometry, numerical simulation is relatively easy and straightforward; in addition, it retains a rich flow physics manifested by the vortex structures in the center and corner regions varying with the Reynolds number (Re). Therefore, it has been studied extensively by different simulation approaches. But still there are some aspects which are not agreed upon and need further investigation. All simulations are conducted by using the Lattice Boltzmann Method in fine grid systems and with parallel algorithm. First, some detailed results are presented and compared with classic solutions found in literatures for code validation. Then the transition process from laminar to turbulent flow in 2D and 3D situations are conducted by increasing the Reynolds number; detailed results for time-velocity histories, and relative Fourier power spectra, phase diagram are given. Some accuracy estimation will be also included.

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