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Lattice Boltzmann LES for MHD Turbulence[1] CHRIS FLINT, GEORGE VAHALA, William & Mary, LINDA VAHALA, Old Dominion University, MIN SOE, Rogers State University — Dellar's lattice Boltzmann (LB) model of 2D incompressible MHD introduced both a scalar velocity and vector magnetic distribution functions, which automatically enforces div B = 0 through the trace of an antisymmetric perturbed tensor. In the Smagorinsky LES model, the filtered Reynolds stresses are modeled by mean field gradient terms, with ad hoc closure eddy transport terms. Ansumali et. al. have developed an LES for Navier-Stokes turbulence by filtering the underlying mesoscopic LB. The filtered LB equations are then subjected to the Chapman-Enskog expansion. A Smagorinsky-like LES is recovered with no ad hoc assumptions other than the subgrid terms contribute only at the transport time scales. Here we extend these ideas to 2D MHD turbulence. The DNS data base is being generated from a multiple relaxation time (MRT) model with a quasi-entropic analytic scheme introduced recently by Karlin et. al. (2014) based on splitting the moment representation into various subgroups.

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Linda Vahala
Old Dominion University

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