Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Lattice Boltzmann representations for MHD Turbulence TAO WANG, GEORGE VAHALA, William & Mary, LINDA VAHALA, Old Dominion University — Lattice Boltzmann (LB) representations are mesoscopic algorithms that exploit a simple collide-stream scheme that is ideal for parallelization – even for non-periodic boundary conditions. Moreover, in LB one can enforce $\nabla \cdot \mathbf{B} = 0$ to machine accuracy. Typically one has introduced a vector distribution function for the magnetic field to account for the asymmetry tensor in the magnetic field evolution as opposed to the symmetric stress tensor in velocity evolution. Here we investigate 2D MHD turbulence by working with a scalar magnetic distribution function representation. A major advantage of the scalar representation is the much reduced computational memory requirements, as well as simpler boundary condition enforcement. The Orszag-Tang vortex will be examined as well as some LES closure schemes using Elsasser variables.

Linda Vahala
Old Dominion University

Date submitted: 09 Jan 2009 Electronic form version 1.4