1023-65-1702 **John B. Bell**, **Sarah A. Williams*** (sawilliams@math.ucdavis.edu) and **Alejandro L. Garcia**. *Numerical Methods for the Stochastic Landau-Lifshitz Navier-Stokes Equations.*

The Landau-Lifshitz Navier-Stokes (LLNS) equations incorporate thermal fluctuations into macroscopic hydrodynamics by using stochastic fluxes. This paper examines explicit Eulerian discretizations of the full LLNS equations. Several CFD approaches are considered (MacCormack's two-step Lax-Wendroff scheme, the Piecewise Parabolic Method, and a modified third-order Runge Kutta method) and all are found to give good results ($\leq 10\%$ error) for the variances of momentum and energy fluctuations. However, among the schemes we investigated only the third-order Runge-Kutta integrator accurately produces density fluctuations while advancing with large time steps. A variety of numerical tests, including the random walk of a standing shock wave, are considered and results from the stochastic LLNS PDE solver are compared with theory, when available, and with molecular simulations. (Received September 26, 2006)