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Hamiltonian Galerkin approximations for equations of geophysical fluid dynamics ALEXANDER GLUHOVSKY, Purdue University — Arbitrary truncations in the Galerkin method commonly used to derive finite-dimensional approximations to PDEs in geophysical fluid dynamics (GFD), called the low-order models (LOMs), often result in LOMs exhibiting unphysical behavior. This can be avoided by retaining in LOMs the fundamental conservation properties of the original system through maintaining the Hamiltonian structure. Earlier, based on certain analogies between fluid dynamics and rigid body mechanics, energy-conserving LOMs in the form of coupled Volterra gyrostats were constructed for various problems in GFD (Gluhovsky and Tong, *Phys. Fluids*, 1999; Tong and Gluhovsky, *Phys. Rev. E*, 2002). In the talk, the development of Hamiltonian LOMs in the form of coupled gyrostats will be discussed. As examples, Hamiltonian LOMs describing 2-D and 3-D Rayleigh-Bénard convection will be considered (including the celebrated Lorenz model and its 3-D analog). The research was supported by NSF grant ATM-0413382.

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