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Numerical modeling of the thin shallow solar dynamo J.B. O'BRYAN, T.R. JARBOE, Univ of Washington — Nonlinear, numerical computation with the NIMROD code is used to explore and validate the thin shallow solar dynamo model [T.R. Jarboe et. al. 2017], which explains the observed global temporal evolution (e.g. magnetic field reversal) and local surface structures (e.g. sunspots) of the sun. The key feature of this model is the presence and magnetic self-organization of global magnetic structures (GMS) lying just below the surface of the sun, which resemble 1D radial Taylor states of size comparable to the supergranule convection cells. First, we seek to validate the thin shallow solar dynamo model by reproducing the ˜11 year timescale for reversal of the solar magnetic field. Then, we seek to model formation of GMS from convection zone turbulence. Our computations simulate a slab covering a radial depth ˜3Mm and include differential rotation and gravity. Density, temperature, and resistivity profiles are taken from the Christensen-Dalsgaard model.

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