1086-86-2453   **Andrew J Majda** and **Samuel N Stechmann***, University of Wisconsin-Madison. *The Skeleton of the Madden-Julian Oscillation: A Nonlinear Oscillator Model.*

The Madden-Julian Oscillation (MJO) is a propagating envelope of complex multi-scale convection/storms in the tropics. With characteristic scales of 30-60 days and 20,000 km, it significantly affects El Nino, monsoons, hurricanes, and midlatitude predictability. Despite its importance, no theory for the MJO has yet been generally accepted, and climate models typically have inadequate representations of it.

In this talk, a minimial, nonlinear oscillator model is analyzed for the MJO "skeleton," i.e., its fundamental features on intraseasonal/planetary scales: (i) slow eastward phase speed of roughly 5 m/s, (ii) peculiar dispersion relation $d\omega/dk \approx 0$, and (iii) horizontal quadrupole vortex structure. Originally proposed in recent work by the authors, the fundamental mechanism involves neutrally stable interactions between moisture, convection, and equatorial fluid dynamics. Linear theory and nonlinear simulations will be presented. In addition, it is also shown that the nonlinear model conserves a total energy that includes a contribution from the convective activity. (Received September 25, 2012)