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Ronald Meyer Caplan* (sumseq@hotmail.com), 4825 College Ave., Apt. 309, San Diego, CA 92115, and **Ricardo Carretero, Enam Hoq** and **Panayotis G Kevrekidis**. *Azimuthal Modulation Stability for Vortices in the Focusing Nonlinear Schroedinger Equation*.

We study the azimuthal modulation instability (MI) of vortex structures, with different topological charges, in the focusing two dimensional nonlinear Schroedinger (NLS) equation. This setting bears direct application in the realm of Bose-Einstein condensates and nonlinear crystals. The method to study the stability relies on freezing the radial direction and applying a MI analysis in Fourier space of the azimuthal modes. We find that, typically, vortices are unstable after a critical azimuthal wave number. Results are corroborated by direct numerical simulations performed on a polar coordinate finite-difference scheme. We also show how to extend the method to encompass non-local nonlinearities (ubiquitous in nonlinear crystals) that tend to stabilize solutions. (Received September 20, 2007)