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**Zhiwu Lin\*** (zlin@math.gatech.edu), **Chongchun Zeng** and **Zhengping Wang**. *Stability of traveling waves of Gross-Pitaevskii equation.*

The Gross-Pitaevskii equations are widely used in modeling superfluids and Bose-Einstein condensates. The GP equation has traveling waves solutions which have non-vanishing limit at infinity, first discovered by physicists (Jones, Roberts et al., 1980s). The existence of such traveling waves has been studied a lot in recent years by Betheul, Saut, Maris and many others. However, the stability and dynamical behaviors near such traveling waves are not well understood. With Zhengping Wang and Chongchun Zeng, we proved a nonlinear stability criterion for 3D traveling waves as conjectured in the physical literature, under a non-degeneracy assumption. Moreover, we prove that 2D traveling waves are always transversely unstable. The stable and unstable manifolds are constructed near unstable traveling waves. The stability criterion was also obtained for traveling waves of general nonlinear Schrödinger equation with nonzero condition at infinity. (Received September 16, 2013)