1109-35-139   **Zhiwu Lin***, 490 stedford ln, Johns creek, GA 30097. *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.) in 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 of these 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, the unstable (stable) manifolds are constructed near unstable traveling waves.This result is also extended for general nonlinear terms and higher dimensions. We also proved that any 2D traveling wave of (GP) is transversely unstable and located the sharp interval for unstable transverse wave numbers. (Received January 28, 2015)