1096-35-1926 **Zhiwu Lin*** (zlin@math.gatech.edu). *Invariant Manifolds for Euler Equations and related equations.*

Consider a linearly unstable steady state of 2D or 3D Euler equations. With Chongchun Zeng, we prove the existence of stable and unstable manifolds near such unstable flows under a spectral gap condition. In particular, the gap condition can be verified for any linearly unstable 2D and 3D shear. The existence of invariant manifolds reveals the local dynamical structures near an unstable flow. The main difficulties of proving existence of invariant manifolds for Euler equations are due to the loss of derivatives in the nonlinear terms and the non-smoothing property of the linearized Euler operator. We developed a mixed Eulerian and Lagrangian approach to handle these difficulties. This approach had been extended to construct invariant manifolds for other problems, including the density dependent Euler equations (with Zeng and Shvydkoy) and Vlasov-Poisson equation for collisionless plasmas (with zeng). (Received September 16, 2013)