1145-37-1 **Maleafisha Joseph Stephen Tladi*** (maleafisha.tladi@gmail.com), Department of Mathematics & Applied Mathemati, University of Limpopo, Polokwane, Limpopo 0727.
Well-Posedness and Long-Time Dynamics of Geophysical Fluid Flows.

The author elucidate in a concrete way dynamical challenges concerning approximate inertial manifolds (AIMS), i.e., globally invariant, exponentially attracting, finite-dimensional smooth manifolds, for nonlinear dynamical systems on Hilbert spaces. The goal of this theory is to prove the basic theorem of approximation dynamics, wherein it is shown that there is a fundamental connection between the order of the approximating manifold and the well-posedness and long-time dynamics of the rotating Boussinesq and quasi-geostrophic equations. Although this article is motivated by challenges in PDE, we consider a two-mode Faedo-Galerkin approximation given by a system of singularly perturbed ordinary differential equations. We note that the foundation for the study of the low-dimensional model of turbulence, which capture the dominant focus energy bearing scales, from the flow for the thermal convection of viscoelastic fluids, is the Lorenz equations extended through singular perturbation. In order to utilize geometric singular perturbation theory and Melnikov techniques, we perturb the problem and carry the nonlinear analysis further to the question of the persistence of inclination-flip homoclinic orbits. (Received March 10, 2018)