Nonlinear Dynamics and Systems Theory, 9(3) (2009) 263–275



## Complete Analysis of an Ideal Rotating Uniformly Stratified System of ODEs

B.S. Desale\*

School of Mathematical Sciences, North Maharashtra University, Jalgaon 425001, India

Received: June 17, 2008; Revised: June 16, 2009

**Abstract:** In this paper we discuss a system of six coupled ODEs which arise in ODE reduction of the PDEs governing the motion of uniformly stratified fluid contained in rectangular basin of dimension  $L \times L \times H$ , which is temperature stratified with fixed zeroth order moments of mass and heat. We prove that this autonomous system of ODEs is completely integrable if Rayleigh number Ra = 0 and determine the stable, unstable and center manifold passing through the rest point and discuss the qualitative feature of the solutions of this system of ODEs.

Keywords: rotating stratified Boussinesq equation; completely integrable systems.

Mathematics Subject Classification (2000): 34A34, 37K10.