1003-35-1272   **Constantin Onica*** (`onica@math.tamu.edu`), 311 Stasney 1411, College Station, TX 77840.
Forced Two Layer Beta-Plane Quasi-Geostrophic Flow Part I: Long-time Existence and Existence of Weak Solutions. Part II: Time and Space Analyticity.

We consider a model of quasigeostrophic turbulence that has proven useful in theoretical studies of large scale heat transport and coherent structure formation in planetary atmospheres and oceans. The model consists of a coupled pair of hyperbolic PDE's with a forcing which represents domain-scale thermal energy source. Although the use to which the model is typically put involves gathering information from very long numerical integrations, little of a rigorous nature is known about long-time properties of solutions to the equations. Our primary motivation in undertaking this study is to put on a firm mathematical ground the calculations in the following paper: R.L. Panetta, Zonal jets in wide baroclinically unstable regions: Persistence and scale selection, J. Atmos. Sci., 50:2073-2106, 1994. In the first part of this study we define a notion of weak solution, and show using Galerkin methods the long-time existence and uniqueness of such solutions. In the second part we show that the above solution is time and space analytic. (Received October 04, 2004)