ICM 1998, Berlin, Aug. 18–27

Abstracts of Short Communications and Posters

Section:

10. Partial Differential Equations

1991 MS Classification: 35, 76, 86

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2-D model of atmosphere dynamics: energy balance and some properties of solutions

To discuss processes of dynamics of baroclinic atmosphere in adiabatic approximation under quasi-static condition we consider the two-dimensional system of equations obtained by averaging over height, taking into account the humidity, the turbulent viscosity and the diffusion.

The balance between the potential and kinetic components of total energy is investigated (under some assumptions it follows that always there is the inavailable potential energy, which can not change over the kinetic one, and the inavailable kinetic energy). Also we obtain the sufficient conditions for the breaking of initially smooth solution of Cauchy problem and estimate the time of breaking.