Singular limits arising in atmosphere modeling

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Abstract

Fluid dynamic equations are used to model various phenomena arising from physics, engineering, astrophysics, geophysics. In particular in the case of a geophysical flow, such as the atmospheric flows one feature is that they take place at different time and length scales and it is important to understand which phenomena occur according to the use of single scales or to the interactions of them (i.e. internal gravity waves, Rossby waves, cloud formation). From a mathematical point of view, these various physical behaviors give rise to different singular limits and, consequently to a different analysis of the asymphtotics of the governing equations. In this talk we will analyze a very simplified model given by a linearized continuity equation and by the classical momentum equation which include terms that take into account of gravitation and rotation and we will show, according to the values of different scales, that the asymptotic behavior of the model will be those of an incompressible fluid or of a geostrophic flow (see [1]).

References

[1] D. Donatelli, Scale analysis for an atmosphere flow, *Preprint 2018*.