Geophysical Research Abstracts, Vol. 7, 03551, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03551

Computational Fluid Dynamics vs. Laboratory Experiments

R. Ziethe, J. A. Whitby, W. Benz

Physikalisches Institut, University of Berne, Sidlerstr. 5, CH - 3012 Bern, Switzerland, (ruth.ziethe@phim.unibe.ch)

The simulation of geodynamical processes is often done numerically, because it is possible to simulate large periods of time in a reasonable time and thus understand formation or evolutionary processes. We use a software package called FEATFLOW to simulate the differentiation (core formation) of the iron and silicate phases in the early evolution of a terrestrial planet. Core formation could have been due to the sinking of large iron bodies. This can be modelled by the sinking of several objects (e.g. spheres) through a fluid. For simplicity we study the behaviour of just one or two spheres during the motion and how they influence each other. However, along with numerical simulation come some difficulties, for instance the right choice of spatial or temporal resolution. Non recognised numerical artefacts might look like reasonable results and thus lead to incorrect conclusions. A laboratory experiment is a good possibility to check on the model assumptions.
We present a simple comparison of a numerical simulation and a laboratory measurement. We study the behaviour of a one or more spheres that simultanously sink through a fluid and implement the experiment parameters in the numerical model. The software package solves numerically the incompressible Navier–Stokes and related extensions for the flow in a moving domain. The presentation will show the pros and cons of numerical models as well as those of laboratory experiments.