



ICAMS special lecture

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Vibrational models used in geophysics

The aim of thermodynamics in geophysics is to develop databases applicable at extreme conditions. For instance pressure and temperature conditions prevailing in the Earth core are about 360 GPa and about 6000 K respectively. In recently discovered exoplanets these conditions can be even more extreme. We apply these databases in mantle convection to determine temperature field and heterogeneity in the Earth and moon. This puts forward the requirement that the thermodynamic formalism, which forms the basis of the database, is sufficiently fast. Although the conventional Calphad technique meets this requirement, anomalous behavior in properties, such as in thermal expansivity hampers the application in the pressure regime above 30 GPa. To prevent unrealistic behavior in thermodynamic properties at high pressure and to obtain a more realistic comparison with results derived from first principles, geophysicists explore vibrational modeling to develop databases.

In this talk I discuss some vibrational techniques used in the geophysical field to develop such thermodynamic databases.