

Is the Inner Core of the Earth Partially Molten

Satish Singh (singh@ipgp.jussieu.fr)

Laboratoire de Geosciences Marines, IPG Paris, 4 Place Jussieu, France

Seismological studies seem to indicate that the inner core of the Earth is anisotropic for the compressional (P) waves, has low shear (S) wave velocity, and has high seismic attenuation. Several models have recently been proposed to explain the presence of anisotropy in the inner core, but none of these models can account for the existence of the low S-wave velocity and high attenuation. Using an effective medium theory for composite materials, we report here that the presence of 5-10% elongated fluid inclusions in the equatorial plane between iron crystals can explain all of the above seismic observations, and supports the idea that the inner core of the Earth could be partially molten. Our model is valid for intrinsic as well as convectionally driven anisotropy, and even in the absence of inner core anisotropy. The fluid could be due to the presence of dendrites or elements other than iron, which is considered to be the major element in the inner core.

Singh SC, Taylor TA & Montagner, JP, *Science*, **276**, 2471-2474, (2000).