

Variations in the equatorial flattening of the inner core

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The inner core shows degree one hemispherical variations between the eastern hemisphere and the western hemisphere, and beneath the middle Africa. In the cylindrical coordinate frame of which axis is coincide with the rotation axis, deformation of the inner core is expressed as variations of the equatorial flattening of the inner core. Here we discuss gravitational coupling between the inner core and the mantle associated with deformation of the equatorial flattening of the inner core. The motion of the outer core is characterized by a velocity potential. The velocity components must vanish at infinite distancs and the normal velocity at any point of the surface on the ICB (the inner core boundary) must be equal to the velocity of the surface at that point normal to itself. Heat flow due to phase changes from the fluid to solid is assumed to be distributed as an axially symmetric around the rotation axis. The flow generates a thermal wind and relative rotation of the inner core. The density gradient in the eastern and western hemispheres in the top 400 km of the inner core induces the equatorial flattening to be 1.69×10^{-5} . This value shows about 2.8 times larger than Szeto and Yu's value 6×10^{-6} (1997).The local variations of the equatorial flattening can excite the mantle and inner core libration (Buffett,1996; Zu et al.,2000;and Aurnou and Olson,2000).

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