On the parameters of state of iron in the Earth and other planets interior

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Iron is widely distributed in the Solar system, has a fairly high density, which explains the relatively high density of the Earth's core. So, it is generally accepted that the Earth and other planets core mainly consist of iron. Convective flows in the Earth's outer liquid core carry heat to the rocky mantle and then to the Earth's surface, affecting the climate. Also, convective flows in a conductive medium maintain the Earth's magnetic field. Therefore, to understand, calculate and predict the behavior of the Earth's core, the most accurate knowledge of the characteristics of iron at high pressures is required. Methods of constructing the equations of state of iron of varying complexity are known. But even for such a fundamental characteristic for the equation of state as the curve of "cold" compression, unacceptably different results were obtained. On the basis of a simple physical model of the condensed matter equation of state and modeling by methods of molecular dynamics, the temperature and sound speed of iron at pressures and densities of the Earth's core were calculated. The isentrope of iron from the bottom to the top of the outer liquid core of the Earth is calculated. It is obtained that, unlike isentrope, the change in the parameters of iron in the core is superadiabatic, which is explained by the heat transfer from the core to the overlying rock mantle of the Earth. In addition, it was obtained that the iron-nickel core of the Earth should contain up to several mass percent additives that reduce density, but increase the sound speed of iron to the necessary geophysical values.