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**Rheology of iron under conditions of the Earth's inner core** ANATOLY BELONOSHKO, Applied Materials Physics, Institutes of Materials Science & Engineering and Theoretical Physics, The Royal Inst. of Technology, 10044 Stockholm, SE — It is well established that the solid Earth's inner core (IC) consists of an iron-rich alloy. However, low rigidity of the IC (Poisson ratio of about 0.44) remains enigmatic. Both measured at low temperature elastic properties of hexagonal (hcp) iron phase as well as the calculated properties of the various hypothetic iron phases at high pressure (above 3 Mbar) and high temperature (from 5000 to 8000 K) are inconsistent with seismological observations. The velocity of shear waves propagation in the IC is considerably lower than the measured/calculated shear velocity of iron phases. We performed ab initio as well as classical molecular dynamics (MD) simulations of iron polycrystals, grown from melt as well as obtained by the Voronoi construction. We demosntrate, that the account for grain boundaries and/or for various structural inhomogeneities allow to bring the calculated data in close agreement with the experimental seismic data.

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