MHD dynamo simulations with various inner core sizes

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It is believed that the Earth's core was totally molten at the earliest stage of its history and then continuously cooled, causing the growth of the inner core. The growth of the inner core influences the convective state of the fluid core via (a) the change in the property of the driving mechanism of convection and (b) the variation of geometry of the fluid core. In this study, to investigate the effect of (b), we performed magnetohydrodynamic (MHD) dynamo simulations with various inner core sizes. (Convections in all the cases are driven only by internal heating.) The studied cases are ri = 0, 0.175, 0.35 and 0.7, where ri denotes the ratio of the inner core radius to the outer core radius. The present size of the inner core corresponds to ri = 0.35. In this presentation, solutions of the case without the inner core (ri = 0), which is not well studied so far (only one solution is reported by Sakuraba and Kono (1999) at relatively low Rayleigh number), will be mainly shown.