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Transverse distortion effects on the Kasteleyn and KDP transition in spin ice[1] CURTISLEE THORNTON, TRINANJAN DATTA, Georgia Regents University — Geometrically frustrated pyrochlore oxides containing a rare-earth ion and a transition metal ion form a network of corner-sharing tetrahedra. Prominent examples include $Dy_2Ti_2O_7$ and $Ho_2Ti_2O_7$. Magnetic frustration in these compounds suppresses the formation of a long-range ordered ground state resulting in an exotic phase of matter called spin ice. Elucidating the role of external perturbations such as pressure and magnetic field is an important step towards understanding the novel KDP and Kasteleyn phase transitions arising in these classical spin ice materials. Utilizing an analytical approach based on the Husimi tree approximation, we investigate the effects of both transverse and uniaxial pressure distortion of the spin ice tetrahedra on both the KDP and Kasteleyn transition in the presence of an external magnetic field. Compared to the uniaxial distortion scenario, we find that including the effects of transverse distortion leads to further suppression of magnetization and heat capacity in both the Kasteleyn and KDP cases.

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