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Magnetic-field evolution and plastic flow in a neutron star's crust

Stresses build up in a neutron star's crust as its magnetic field evolves, until the crust eventually yields. This occurs as a plastic deformation, and is believed to be responsible for coronal activity from magnetars. Existing simulations of crustal magnetic-field evolution assume, however, that the crustal lattice is fixed and never yields, meaning that the field evolves only under the processes of Hall drift and Ohmic decay. Here we present the first simulations which solve for the plastic flow that occurs when magnetic stresses become too large to be sustained, and the effect of this flow on the crust's magnetic-field evolution.

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