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3D relaxation of flux ropes: boundary conditions, bouncing, merging, onset of reconnection[1] T.P. INTRATOR, X. SUN, L. DORF, G. LAPENTA, Los Alamos National Laboratory — Magnetic fields in MHD plasmas also have corresponding image (ie source) currents. This situation can be represented with flux ropes, which are the building blocks of MHD plasmas. Examples that are 3D and not toroidal include in nature: Solar coronal loops, coronal holes, astrophysical jets; and in the laboratory: spheromaks, Z pinch, spacecraft thrusters, etc. For these situations, the axial boundary conditions are important. Using the Reconnection Scaling Experiment (RSX) we create an experimental laboratory model with 1, 2 or more linear flux ropes, with embedded current parallel to an external magnetic guide field. A current channel can relax via instability (e.g. kink), and we take advantage of this to revisit the notion of what line tying means. Multiple ropes mutually attract via strong, ideal MHD JxB forces. They are observed to bounce or coalesce (magnetically reconnect) depending on the speed of mutual approach. 3D relaxation occurs when flux ropes rotate about each other, while twist is transferred into writhe via the kink instability.

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