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Energy Loss from Reconnection with a Vortex Mesh RENA ZIEVE, INGRID NEUMANN, University of California, Davis — We have observed experimentally that a vortex moving in a cylindrical cell loses energy up to eight orders of magnitude more rapidly than expected from bulk mutual friction alone. Here we investigate the possibility that reconnections with a mesh of small vortices pinned to the cell wall dominate the energy loss. Such pinned vortices may be an unavoidable consequence of rotating the cryostat. Once rotation ceases, most vortices move to the cell wall and annihilate, leaving behind fragments pinned at any microscopic wall roughness. We simulate the situation by requiring the free vortex to move at the local superfluid velocity, and by allowing for reconnections when two vortices approach closely. To keep the simulation run time practical, we use an artificially high friction coefficient. We find that as the vortex moves, reconnections with pinned vortices can reduce its length, and hence its line energy. The energy dissipation of the vortex moving through the mesh can exceed the loss rate from mutual friction by 50% to 100%.

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