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Topology of the intermediate state in pinning-free type-I superconductors of different shapes[1] JACOB R. HOBERG, RUSLAN PROZOROV, Ames Laboratory and Department of Physics & Astronomy, Iowa State University, Ames IA 50011 — Equilibrium patterns of the intermediate state were studied in pinning-free Pb samples of different shapes by using direct magneto-optical visualization as well as AC and DC susceptibility measurements. It is found that equilibrium topology of the intermediate state in spheres and hemispheres consists of flux tubes both on flux penetration and exit. Samples with geometric barrier (two flat surfaces perpendicular to an applied magnetic field) exhibit topological hysteresis (and corresponding magnetic hysteresis) – tubes for flux penetration and Landau laminar structure on flux exit. Finally, obtuse-cone shaped samples show laminar structure both on penetration and exit. Based on the experimental results, general discussion of the equilibrium topology of the intermediate state is given. Video of real-time intermediate state evolution with an applied field for various samples is available at: http://www.cmpgroup.ameslab.gov/supermaglab/video/Pb.html

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