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Unconventional Vortex Dynamics in Mesoscopic Superconducting Corbino Disks[1] VYACHESLAV R. MISKO, NANSHENG LIN, FRANCOIS PEETERS, University of Antwerp, Belgium — The dynamics of vortex *shells*, driven by an external current I_0, is studied in a Corbino setup, in mesoscopic disks with two to six shells. The transition from a rigid-body rotation to a separate rotation of shells is analyzed as a function of I_0 and temperature T. The critical current I_c has a remarkable nonmonotonous dependence on the applied magnetic field due to a dynamically induced structural transition [1]. Thermally activated externally driven flux motion in a disk with pinning centers explains the dynamically induced two-step melting transition observed in experiment [2]. We analyze different scenarios of the current- driven angular melting of shell configurations determined by the interplay between the gradient Lorentz force and the (in) commensurability between the number of vortices in adjacent shells. The inter- and intra-shell defects lead to unconventional dynamics of vortex shells [3]. [1] V.R. Misko and F.M. Peeters, Phys. Rev. B **74**, 174507 (2006). [2] D. Lopez et al., Phys. Rev. Lett. **82**, 1277 (1999). [3] V.R. Misko, N. Lin, and F.M. Peeters, unpublished (2008).

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