Development of energy spectra of a vortex tangle

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Bradley *et al*. studied experimentally emission of vortex rings by a vibrating grid in superfluid ^{3}He-B [1] . They obseeved a sharp transition from ballistic propagation of vortex rings at low grid velocities to quantum turbulence at higher velocities. We could understand the transition from the full Biot-Savart numerical simulation of the vortex filament model [2]. In this work we study numerically the energy spectra of vortices following the simulation of Ref. 2. As the vortices are emitted densely to become turbulent through lots of vortex reocnections, the energe spectra changes from that characteristic of a group of vortex rings to some characteristic power law of a tangle.

[1]D. I. Bradley *et al*., Phys. Rev. Lett. **95**, 035302 (2005).
[2]S. Fujiyama *et al*., Phys. Rev. B **81**, 180512(R) (2010).