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Simulation of elastic and elasto-inertial turbulence in straight channel flows YVES DUBIEF, University of Vermont, VINCENT TERRAPON, SAMIR SID, University of Liege — Elastic turbulence (ET, Nature, **410**, 905-908, 2000) is a chaotic flow state generated and sustained by polymer additives at vanishing Reynolds numbers. It is generally accepted that elastic turbulence occurs when the mean flow streamlines are curved. Elasto-inertial turbulence (EIT, PNAS, **220** (26), 10557-10562, 2013) is a similar state of turbulence that happens in inertial flows with mean straight flow streamlines at Reynolds numbers for which the flow is laminar in the absence of polymers. A recent experiment (PRL **110**, 174502, 2013) has shown that ET generated by the insertion of cylinders at the inlet of a low Reynolds number channel flow is sustained downstream of the perturbation. This experiment suggests a possible relation between ET and EIT. Our study will first confirm that sustained ET can be triggered in low-Reynolds number channel flows. ET is shown to exist in two- and three-dimensional simulations for Reynolds numbers of the order of 100 or less. Much like the aforementioned experiment, the initial conditions triggering ET cause the flow streamlines to be curved for a short duration at the beginning of the simulation. Our study will then discuss the similarities and differences between ET and EIT.

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