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Coherent structures in plane Couette flow of viscoelastic fluids ALEXANDER MOROZOV, Instituut-Lorentz for Theoretical Physics, Leiden University, The Netherlands — Newtonian fluids are known to exhibit turbulent behaviour at large enough Reynolds numbers. Recently, it has been discovered that flows of viscoelastic fluids in simple geometries become chaotic at arbitrary low Reynolds numbers, the so-called "elastic turbulence," due to the presence of anisotropic elastic stresses. While Newtonian parallel shear flows, at least close to the transition, are believed to be organised around a few coherent structures – exact solutions of the Navier-Stokes equations, the structure of the elastic turbulence remains unknown. Here we present a mean-field theory for the exact coherent structures in the presence of polymers. We calculate the region of existence of these structures for large Reynolds numbers and weak viscoelasticity which is relevant to the drag-reduction problem, and compare it to the recent numerical results of M. Graham *et al.* We discuss the possibility that these solutions are connected to the solutions at low Reynolds numbers – purely elastic coherent structures.

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