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Elastic Alfven waves in elastic turbulence VICTOR STEINBERG, Weizmann Institute of Science, ATUL VARSHNEY, Institute of Science and Technology Austria, Am Campus 1, 3400 Klosterneuburg, Austria — Speed of sound waves in gases and liquids are governed by the compressibility of the medium. There exists another type of non-dispersive wave where the wave speed depends on stress instead of elasticity of the medium. A well-known example is the Alfven wave, which propagates through plasma permeated by a magnetic field with the speed determined by magnetic tension. An elastic analogue of Alfven waves has been predicted in a flow of dilute polymer solution where the elastic stress of the stretching polymers determines the elastic wave speed. Here we present quantitative evidence of elastic Alfven waves in elastic turbulence of a viscoelastic creeping flow between two obstacles in channel flow. The key finding in the experimental proof is a nonlinear dependence of the elastic wave speed c_{el} on the Weissenberg number Wi, which deviates from predictions based on a model of linear polymer elasticity.

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