

Abstract Submitted  
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**Instability in extensional microflow of aqueous gel**<sup>1</sup> ROBERT BRYCE, Department of Physics, University of Alberta, Edmonton, Canada T6G 2G7, MARK FREEMAN, Department of Physics, University of Alberta, Edmonton, Canada T6G 2G7; Institute for Nanotechnology, Edmonton, Canada T6G 2M9 — Microfluidic devices are typically characterized by laminar flows, often leading to diffusion limited mixing. Recently it has been demonstrated that the addition of polymer to fluids can lead to elastic instabilities and, under some conditions, turbulence at arbitrarily low Reynolds numbers in mechanically driven flows [1]. We investigated electroosmotic driven extensional flow of an aqueous polymer gel. Microchannels with 100 micron width and 20 micron depth with the characteristic “D” chemical etch cross section were formed in glass. A Y-channel geometry with two input channels and a single output created extensional flow at the channel intersection. Instabilities were observed in the extensional region by fluorescently tagging one input stream. Instabilities were characterized by 1/f spectra in laser induced fluorescent brightness profiles. Due to the simple geometry of extensional flow and the importance of electroosmotic flows for integrated applications and in scaling, this is of interest for device applications. [1] A. Groisman and V. Steinberg, Nature 405, 53-55, 2000.

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