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**Electrokinetic turbulence in a microchannel at low Reynolds number**[1] WEI ZHAO, FANG YANG, GUIREN WANG, Department of Mechanical Engineering, University of South Carolina, Columbia — Turbulence is commonly viewed as a type of macroflow phenomenon under a sufficiently high Reynolds number (Re). On the other hand, it has been widely perceived in science, engineering and medicine that there is never any turbulence in low Re flow for Newtonian fluids. There is even difficulty to characterize turbulence in microchannels with current available velocimeters, due to the requirement of simultaneously high spatial and temporal resolution. Recently, we generated micro-electrokinetic (EK) turbulence in a microchannel when a pressure driven flow at low Re on the order of unity is electrokinetically forced. We also developed a novel velocimeter, i.e. laser induced fluorescence photobleaching anemometer (LIFPA) that enables us to measure the velocity fluctuations with simultaneously high spatial and temporal resolution. Here we surprisingly observed with LIFPA that the corresponding micro EK turbulence can also have some features of high Re flows, such as Kolmogorov -5/3 spectrum and the exponential tail of probability density function of velocity fluctuation, and the scaling behavior of velocity structure function. This work could provide a new perspective on turbulence.

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Guiren Wang
Dept of Mechanical Engineering and Biomedical Engineering Program,
University of South Carolina, Columbia

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