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Chaotic dynamics of a Quincke rotor in 3D[1] GERARDO PRADLLO, HAMID KARANI, PETIA VLAHOVSKA, Northwestern University — The Quincke effect is an electrohydrodynamic instability which gives rise to a torque on a dielectric particle in a uniform DC electric field. The equations which describe the resulting rotation are known to map onto the Lorenz equations (Peters et al, Chaos (2005)), predicting the existence of a second bifurcation upon which rotation is no longer steady. In this presentation we discuss the dynamics of the Quincke rotor in 3D, using the recently discovered hovering state (Pradillo et al, Soft Matter (2019)) at high electric fields. We experimentally confirm the existence of chaotic motion and demonstrate the presence of periodic regimes in this previously unexplored 3D system. Our experimental results are compared to the solutions of the fully three-dimensional model.

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