Abstract Submitted
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Critical modes due to Archimedean buoyancy and dielectrophoretic force in a dielectric liquid in cylindrical annulus[1] ANTOINE MEYER, LOMC, UMR6294, CNRS-Université du Havre, HARUNORI YOSHIKAWA, LMJAD, UMR 7351, CNRS- Universit de Nice Sophia Antipolis,, OLIVIER CRUMEYROLLE, INNOCENT MUTABAZI, LOMC, UMR6294, CNRS-Université du Havre — An incompressible dielectric fluid is confined in a cylindrical annulus maintained at two different temperatures and an electric tension in Earth gravity. The coupling between the electric field and the thermal variation of the permittivity leads to a dilectrophoretic force that acts as a buoyancy force to induce convective flows. We have performed the linear stability analysis to determine the critical parameters and the nature of critical modes for different values of the control parameters. Four types of modes were found: For weak values of the electric tension, the critical modes are either hydrodynamic or thermal modes depending on the Prandtl number and for large values of electric tension lead to electric modes [1]. For its intermediate values, critical modes are columnal vortices, similar to those observed in simulations of the convection in a cylindrical annulus with a radial gravity [2].

[1] H.N. Yoshikawa et al., Phys.Fluids **25**, 024106(2013).
[2] A. Alonso et al., Fluid. Dyn. Res. **24**, 133 (1999).

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