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Thermal creep flux in a complex plasma MIERK SCHWABE, SERGEY ZHDANOV, MILENKO RUBIN-ZUZIC, HUBERTUS THOMAS, GREGOR MORFILL, Max-Planck-Institute for Extraterrestrial Physics — Complex plasmas are plasmas containing microparticles in addition to ions, electrons and neutrals. Under gravity conditions, the microparticles are pulled towards the lower part of the plasma chamber, where they are levitated by the strong electric field in the sheath. In order to perform experiments in the bulk of the discharge, the experimental set-up can either be transported to microgravity conditions (e.g. on board the International Space Station or during parabolic flights), or gravity can be compensated by an additional force. A force capable of compensating gravity is the thermophoretic force, which is the result of a temperature gradient between the upper and lower part of the plasma reactor. The application of a strong temperature gradient, however, has "side effects." One of those effects is that a convection of the neutral gas is induced by the thermal creep effect, which is relevant especially in rarefied gases. We present measurements of this gas convection using microparticles levitated in the plasma and show that thermal creep is relevant in conditions typical for complex plasma experiments. As example for the strong influence of this convection, we show that it can induce a Rayleigh-Taylor instability in the complex plasma fluid.

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