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The DC bias in complex plasma experiments involving thermophoresis VICTOR LAND, JORGE CARMONA REYES, JAMES CREEL, JIMMY SCHMOKE, MICHAEL COOK, LORIN MATTHEWS, TRUELL HYDE, CASPER, Baylor University, Waco, TX, 76798, USA — In recent complex plasma experiments involving thermophoresis at the Center for Astrophysics, Space Physics and Engineering Research (CASPER), it was observed that the natural DC bias on the powered lower electrode in a modified GEC cell changes with the applied temperature on the lower electrode. The levitation height of dust particles suspended above this electrode was observed to differ in these experiments from the levitation heights obtained employing a fixed DC bias. Using electronic data, Langmuir probe data in the plasma bulk, as well as passive optical emission data in the sheath, it is shown that the plasma characteristics, involving the real and imaginary part of the discharge impedance, change with the electrode temperature. These results, together with results from a self-consistent plasma fluid model in argon, show that the neutral gas density changes with electrode temperature, when running at constant pressure, due to the heating of the gas in the volume. It is therefore important to report the DC bias value in complex plasma experiments involving thermophoresis rather than simply reporting the value obtained at room temperature.

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