A genuinely discontinuous approach for multiphase EHD problems MAHESH NATARAJAN[1], OLIVIER DESJARDINS[2], Cornell University — Electrohydrodynamics (EHD) involves solving the Poisson equation for the electric field potential. For multiphase flows, although the electric field potential is a continuous quantity, due to the discontinuity in the electric permittivity between the phases, additional jump conditions at the interface, for the normal and tangential components of the electric field need to be satisfied. All approaches till date either ignore the jump conditions, or involve simplifying assumptions, and hence yield unconvincing results even for simple test problems. In the present work, we develop a genuinely discontinuous approach for the Poisson equation for multiphase flows using a Finite Volume Unsplit Volume of Fluid method. The governing equation and the jump conditions without assumptions are used to develop the method, and its efficiency is demonstrated by comparison of the numerical results with canonical test problems having exact solutions.

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