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Verification and validation studies of continuum simulations of low-temperature plasmas BENJAMIN MARSHALL, ABHISHEK KUMAR VERMA, AYYASWAMY VENKATTRAMAN, Univ of California - Merced — State-of-the-art microplasma devices have contributed to several challenges that require a fundamental understanding of the various mechanisms involved in order to achieve optimal operation for a given application. In this context, the role of computations cannot be stressed enough. Historically, the computational techniques used for simulating plasmas belong to two categories continuum/fluid and kinetic methods. The primary goal of the current work is to report the exhaustive verification and validation studies performed using our in-house plasma solver implemented in the OpenFOAM framework. The continuum simulations presented here include continuity, conservation of momentum equations for both electron and ion species, an energy equation for electrons and the Poisson's equation for potential solution. The convergence characteristics of the continuum solver are presented for a range of pressures and excitation frequency (both direct current and high frequency operation are considered). The influence of the numerical schemes and models on the obtained solutions are also quantified.

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