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Advanced simulations of application plasmas: Comparisons with experiments and validations[1]

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Continuum-fluid and particle-in-cell models are the numerical simulation techniques commonly used for simulating low-temperature plasmas for plasma technology applications. Simulations can often identify research guidelines and propose novel designs leading to performance improvements in different plasma systems. We present an overview of the principles, strengths and limitations of the these. These modeling results are benchmarked by comparing in different plasma systems (capacitively and inductively coupled plasmas) with experimentally measured data and with other numerical results. The potential profile and the electron/ion kinetic information such as electron/ion energy distributions and temperatures are important for understanding the plasma phenomena. Kinetic 1d particle-in-cell/Monte-Carlo-collision and fluid modelings of Ar-oxygen plasma sources are carried out in the wide parameter range.

[1]In collaboration with SH Lee, GY, Park, F Iza, HC Kim (UC Berkeley), SS Yang, SJ Kim