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The utility of dynamic adaptive chemistry for simulations of plasma-surface interaction[1] JOSE ALFREDO MILLAN-HIGUERA, VENKATTRAMAN AYYASWAMY, University of California Merced — The interaction of low-temperature plasmas with various surfaces exposed to it is an actively studied problem with relevance to several applications including plasma medicine, plasma-assisted surface modification, and plasma etching to name a few. From a computational perspective, the role of plasma chemistry cannot be stressed enough in order to be able to capture important mechanisms observed in experiments. In general, studies which emphasize on the plasma chemistry tend to include a large number of species and reactions for these simulations. While some researchers have performed sensitivity analysis studies and proposed reduced chemistry mechanisms, it is still not clear if the reduction based on certain conditions will work at other conditions. In order to address this disadvantage, we borrow computational techniques that are popular in the combustion community to develop a computational framework that allows for dynamic chemistry reduction in plasma chemistry simulations. This talk will present preliminary results obtained using the in-house computational framework for a 0-D simulation as well as a 1-D simulation of a plasma facing a dielectric. The decrease in computational cost and accuracy as a result of the dynamic reduction are both quantified for argon, helium and air plasmas.

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