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Plasma Chemistry Reduction from ILDM TAFIZUR REHMAN, Department of Applied Physics, Eindhoven university of Technology, Eindhoven, The Netherlands, EFE KEMANECI, Ruhr university Bochum, Theoretical Electrical Engineering, Bochum, Germany, WOUTER GRAEF, Plasma Matters B.V., JAN VAN DIJK, Department of Applied Physics, Eindhoven university of Technology, Eindhoven, The Netherlands — Numerical simulation of plasma models involving large number of species and reactions is computationally expensive. One of the solutions of this problem is to employ Chemical Reduction Techniques (CRT) used in combustion research. The CRT that we apply here is Intrinsic Low Dimensional Manifold (ILDM). ILDM uses the fact that the reaction system is not evenly sensitive to all the reactions, but some reactions are fast and attain steady state in a short interval of time. Based on this information, the ILDM method finds the lower dimensional space inside a complete state-space. After a short time interval the fast processes have relaxed and the densities evolve on a low dimensional manifold of the solution space. Construction of such a lower dimensional manifold allows the reaction space to be described in terms of fewer parameters and it becomes possible to tabulate the results in terms of those parameters. By generating a look-up table for given values of controlling parameters, the remaining parameters are computed explicitly. In this work we apply the ILDM method to argon containing 78 levels. The results are compared with the full simulation. The method is validated by comparison of the results with a traditional collisional radiative model.

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