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Application of ILDM Technique for Simplifying Complex Plasma Chemistry[1] TAFIZUR REHMAN, KIM PEERENBOOM, EFE KEMANECI, WOUTER GRAEF, JAN VANDIJK, Eindhoven University of Technology — Complete numerical description of plasma involves solving complex set of space and time dependent conservation and rate equations. Solution of this large set of equations induces a high computational load on the system. Combustion research is another branch of science that deals with the same issue. To overcome the difficulty, combustion community employs various Chemical Reduction Techniques(CRT). The CRT simply uses the fact that, due to wildly varying time scales, reaction system is not evenly sensitive to all the reactions but some reactions are fast and attain steady state in short interval of time. Hence, fast time scale variation becomes less important and the full description of the system can be given by the slow time scales without any significant loss in chemical kinetics description. The chemical reduction technique we employed is ILDM (Intrinsic Low Dimensional Manifold). This technique finds the low dimensional space inside a complete state space such that after a short interval of time the fast time scales of the system will quickly move onto this low dimensional manifold and the full system description can be given by this lower dimensional manifold. One can use these techniques of combustion research to simplify the complex chemistry in plasma simulation.

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