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A Robust Compressible Flow Solver for Studies on Solar Fuel Production in Microwave Plasma SAMANEH TADAYON MOUSAVI, PETER KOELMAN, PhD Candidate, Eindhoven University of Technology, PIETER WILLEM GROEN, Dutch Institute for Fundamental Energy Research (DIFFER), JAN VAN DIJK, Assistant professor, Eindhoven University of Technology, EPG/ APPLIED PHYSICS/ EINDHOVEN UNIVERSITY OF TECHNOLOGY TEAM, DUTCH INSTITUTE FOR FUNDAMENTAL ENERGY RESEARCH (DIFFER) TEAM — n order to simulate the dissociation of CO_2 with H_2O admixture by microwave plasma for the production of solar fuels, we need a multicomponent solver that is able to capture the complex nature of the plasma by combining the chemistry, flow, and electromagnetic field. To achieve this goal, first we developed a robust finite volume compressible flow solver in C++. The solver is implemented in the framework of the PLASIMO software and will be used in complete plasma simulations later on. Due to the compressible nature of the solver, it can be used for simulation of dissociation of CO_2 with H_2O admixture by supersonic expansion in microwave plasmas. A spatially second order version of this solver is able to reveal the vortex flow structure of the plasmas. Capabilities of this solver are presented by benchmarking against well-established analytical and numerical test cases.

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