ON THE DEVELOPMENT AND VALIDATION OF A PARALLEL HYPERSONIC SOLVER FOR THERMOCHEMICAL NONEQUILIBRIUM GASES

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Abstract. In this talk a fully-implicit grid-transparent finite volume method with second-order discretization oriented to the numerical simulation of hypersonic reactive flows is presented. The solver incorporates chemical kinetics, partial ionization and thermodynamic nonequilibrium effects in order to capture flow features present in re-entry flows scenarios. With the aim of validating the developed methodology, numerical computations of viscous laminar hypersonic flows over re-entry configurations are obtained and compared with test-flights and shock tube tests experimental results. Some aspects on the software design and implementation, and how parallel capabilities are achieved by employing an unstructured mesh library developed with this objective are also briefly discussed.