Development, Verification and Validation of VizArc: a General-Purpose Thermal Plasma Simulation Tool SHANKAR MAHADEVAN, DOUG BREDEN, Esgee Technologies, Inc., LAXMINARAYAN RAJA, The University of Texas at Austin — This work describes a recently developed general-purpose simulation tool (VizArc) for computational modeling of thermal (arc) plasmas. These plasmas typically exist in systems where the pressures range from 0.1-10 atm and with temperatures ranging from about 1000 K to $\sim$10,000's K. VizArc solves a coupled set of non-linear governing equations that describe physical and chemical phenomena in multi-species, single-temperature, quasi-neutral plasma. Governing equations for the flow and electromagnetic quantities in the gas and heat transfer in solids are included. Applications include the modeling of spark discharges, HID lamps, circuit breakers and welding/spray coating. Verification and validation, which are essential aspects of computational code development, are discussed. The steps involved in verification and validation of the new model are described, including component-wise verification, a grid convergence study, parallel implementation verification, and comparison of model results with experimental results from the literature.

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