**Design And Analysis Of Rocket Nozzle**

**Abstract**

Rochester Institute of Technology’s Microsystems Engineering & Technology for the Exploration of Outer Regions (METEOR) project has been investigating and pursuing a low cost alternative launch system for launching pico-satellites to Low Earth Orbit (LEO). A major component of this system is a three-stage rocket for orbital insertion. Of all the parts that make up a rocket engine, the nozzle and its ability to convert thermal energy into kinetic energy is the most important in creating an efficient rocket. This paper develops a computer code which uses the Method of Characteristics and the Stream Function to define highefficiency nozzle contours for isentropic, inviscid, irrotational supersonic flows of any working fluid for any user-defined exit Mach number. The contours were compared to theoretical isentropic area ratios for the selected fluid and desired exit Mach number. The accuracy of the nozzle to produce the desired exit Mach number was also checked. The flowfield of the nozzles created by the code were independently checked with the commercial Computational Fluid Dynamics (CFD) code FLUENT. FLUENT predictions were used to verify the isentropic flow assumption and that the working fluid reached the user-defined desired exit Mach number. Good agreement in area ratio and exit Mach number were achieved, verifying that the code is accurate.