

5. No heat transfer from the rocket engine.
6. Flow is isentropic except across the shock.
7. Uniform chamber conditions at the nozzle entrance; flow properties, namely, pressure, temperature, and density remain constant.
8. Velocity at the nozzle entrance is negligibly small as compared to its exit.
9. Gas composition across the nozzle remains constant. Frozen flow in the nozzle.
10. Gas leaves nozzle exit along axial direction only.

These simplifying assumptions are quite useful in deriving simplified performance parameters that are helpful in characterizing the chemical rocket engine. Subsequently, we will discuss the correction factors by which this idealized model can be improved further.

3.3 THRUST EQUATION OF ROCKET ENGINES

An expression for the thrust developed by a rocket engine under static condition can be obtained by applying the momentum equation. For this, let us consider a control volume (CV), as shown in [Figure 3.1](#). The propulsive thrust “ F ” acts in a direction opposite to V_e . The reaction to the thrust “ F ” on the CV is opposite to it. The momentum equation for such CV is given by [4]

$$\frac{d}{dt} \int_{CV} \rho V_x dV + \int_{CS} V_x (\rho V_x \cdot n) dA = \sum F_x \quad (3.1)$$

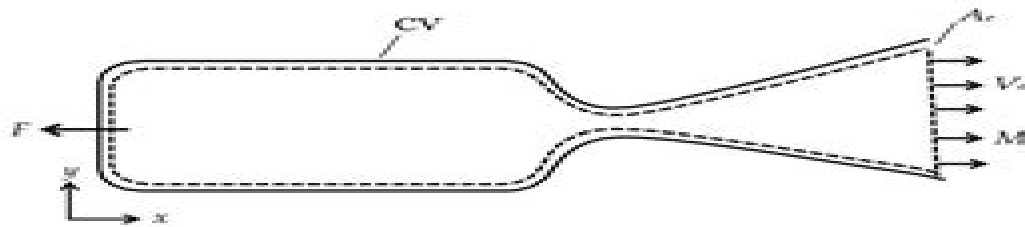


FIGURE 3.1 Control volume of rocket engine.

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Computational Intelligence in Decision and Control Da Ruan, Javier Montero, 2008 FLINS originally an acronym for Fuzzy Logic and Intelligent Technologies in Nuclear Science is now extended to Computational Intelligence for applied research The contributions to the eighth edition in the series of FLINS conferences cover state of the art research development and technology for computational intelligence systems in general and for intelligent decision and control in particular

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Industrial Laboratories, 1957 **Computer Program Abstracts**, 1970 **Journal** Institution of Mechanical Engineers (Great Britain), 1947 **Rocket Propulsion Elements** George P. Sutton, Oscar Biblarz, 2016-12-27 ROCKET

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