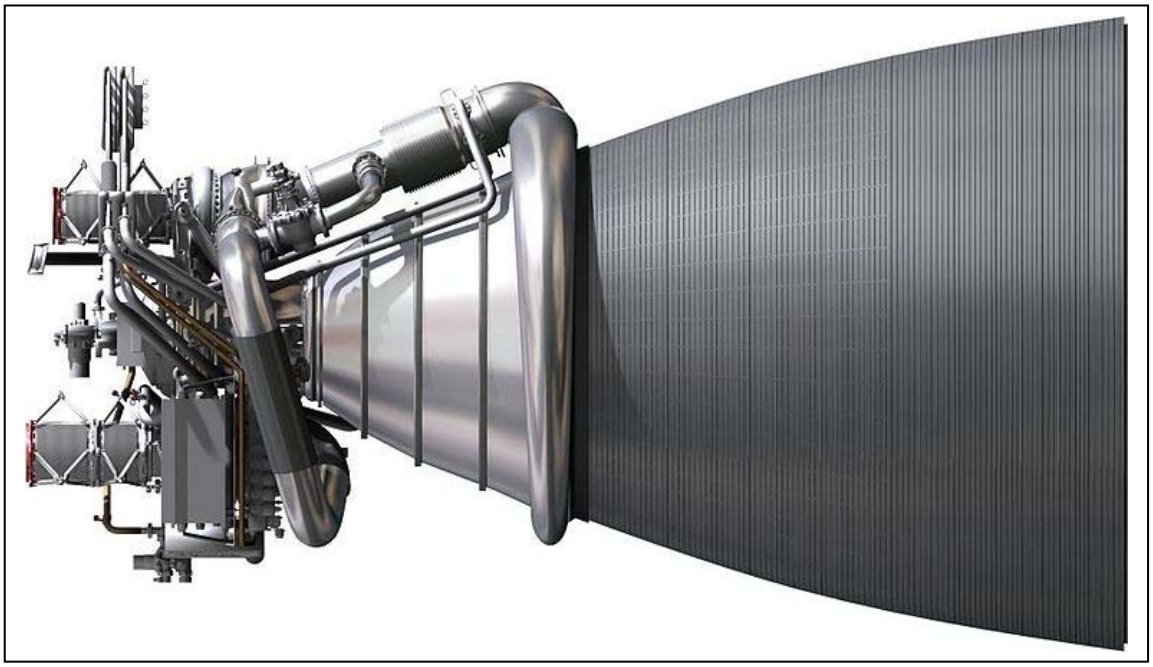

Problem 1 – The volume of a cone is given by $V = 1/3\pi R^2 h$. If the base of the rocket nozzle has a radius of r = 1.53 meters (5-feet) and a height of h = 4.37 meters (13-feet), what is the approximate total volume of the J-2X rocket nozzle to the nearest 0.1 cubic meters? (Use $\pi = 3.14$)

Problem 2 – A better approximation to the shape of the curved nozzle is to break the volume up into a conical top section (h=2.18 meters) and a cylindrical bottom section (h=2.18 meters). If the base of the cone in the top section has a radius of 1.00 meter, and the average radius of the cylinder in the bottom section is R=(1.00 + 1.53)/2 = 1.27 meters, what is the total volume of the total nozzle to the nearest 0.1 cubic meters? (Use $\pi = 3.14$)

Problem 3 – The exact volume of the volume for this curved nozzle is given by the function

$$V(x) = 0.0094\, x^4 - 0.141\, x^3 + 1.10\, x^2 + 0.14\, x$$

where V is in cubic meters and x is the distance from the vertex of the cone to its base. What is the exact volume of the J-2X rocket nozzle to the nearest 0.1 cubic meters ?

Problem 1 – The volume of a cone is given by $V = 1/3\pi R^2 h$. If the base of the rocket nozzle has a radius of r = 1.53 meters and a height of h = 4.37 meters, what is the approximate total volume of the J-2X rocket nozzle to the nearest 0.1 cubic meters? (Use $\pi = 3.14$)

Answer: $V = 1/3\ (3.14)\ (1.53)^2\ (4.37) =$ **10.7 meters^3**

Problem 2 – A better approximation to the shape of the curved nozzle is to break the volume up into a conical top section (l=2.18 meters) and a cylindrical bottom section (L=2.18 meters). If the base of the cone in the top section has a radius of 1.00 meter, and the average radius of the cylinder in the bottom section is (1.00 + 1.53)/2 = 1.27 meters, what is the total volume of the total nozzle to the nearest 0.1 cubic meters? (Use $\pi = 3.14$)

Cone = $1/3\ (3.14)(1.0)^2(2.18) = 2.28$ meters^3
Cylinder = $3.14\ (1.27)^2\ (2.18) = 11.04$ meters^3
Approximate total volume = **13.3 meters^3**.

Problem 3 – The exact volume of the volume for thus curved nozzle is given by the function $V(x) = 0.0094x^4 – 0.141x^3 + 1.10x^2 + 0.14x$ where V is in cubic meters and x is the distance in meters from the vertex of the cone to its base. What is the exact volume of the J-2X rocket nozzle to the nearest 0.1 cubic meters?

Answer: $V(4.37\text{meters}) = 0.0094(4.37)^4 – 0.141(4.37)^3 + 1.10\ (4.37)^2 + 0.14(4.37)$
$= 3.43 - 11.77 + 21.00 + 0.61$
$= 13.27$
= **13.3 meters^3**.