available because in adiabatic cooling the ion and electron will recombine. It is easily calculated that this leads again, at 10,000°, to $1/(\gamma - 1) = 4.5$.

We have only considered the internal energy of the uranium and have not yet taken into account the work done by the expansion of the uranium. This, however, is exactly compensated by the work done on the Na and structural material by compression. Moreover, this work is very small, amounting in the case of Na per unit core volume to:

$$E_{Na} = -\int p \, d\, V_{Na} \qquad (17)$$

Now, as we have mentioned, the compressibility of Na decreases appreciably with pressure. We, therefore, overestimate E_{Na} if we assume p to be linear in the compression, thus

$$E_{Na} < \frac{1}{2} p \; \Delta V_{Na} \qquad (17a)$$

But ΔV_{Na} is about 10% of the total volume, or $0.4\ V_o$, and with

$$E_U = p\, V_o/(\gamma - 1) \qquad (18)$$

and $1/(\gamma - 1) = 4.5$, we have

$$E_{Na} < 0.05\ E_U \qquad (18a)$$

which is negligible.

The heat flow from fuel to the other materials is also small. The heat first has to penetrate through the structural material; e.g., the pins. In heat conduction, the distance of penetration in time t is roughly given by

$$x^2 = \frac{k}{c_v \rho} \; t \qquad (19)$$