PROBLEMS

1. The diffusion length for thermal neutrons in water is 2.8 cm. Now the neutron distribution is Maxwellian, so the average velocity is $\bar{V} = (2/\sqrt{\pi})\, V$ (where v is the velocity in $mv^2/2 = kT$) or $\bar{V} = \sqrt{8kT/\pi m}$. To calculate the mean free path for absorption (Λ), we must use σ_a for neutrons with velocity $\bar{V}$ rather than v. Given $\sigma_a = 0.31$ barns for room temperature neutrons ($v = 2200$ m/sec; see Figure 11, page 24), calculate Λ for $\bar{V}$ neutrons. What is the transport mean free path for thermal neutrons (Maxwell distribution) in water?

2. If ξ is the average fraction (averaged over angles of incidence) of incident neutrons absorbed in the foil, find the relation between A/B and the albedo.

a-93-86