Therefore $\sigma_{ab} = \sigma_s(H)/N = \lambda/3\tau'$ where $\tau' = \tau - \tau_0$.

At the interface between active material and water (x = 0) the usual continuity of neutron density and current boundary conditions were applied, namely:

$$n_1(0) = N_1(0) \text{ and } \lambda(n\nu)_1' = \Lambda_1(N\nu)_1' \tag{3}$$

In Eqs. 1 and 3 and hereafter the neutron density and mean free path are designated respectively by lower case n and λ in the water, and upper case N and Λ in the active material.

Applying the boundary conditions (3) the solutions satisfying Eqs. 1a and 1b are

$$(n\nu)_1 = (3I\tau')(\lambda l)^{-1}\,(1 - \sqrt{\tau'}/l)^{-1}\,A(\tau')\,[e^{-x/l} - (\sqrt{\tau'}/l)(1 + S_1 l/\lambda)\,B(\tau')\,e^{-x/l}\sqrt{\tau'}] \tag{4a}$$

and

$$(N\nu)_1 = (3I\tau')(\lambda l)^{-1}\,A(\tau')\,B(\tau')\,e^{+x/L} \tag{4b}$$

where

$$A(\tau') = (1 + \sqrt{\tau'}/l)^{-1},\ B(\tau') = (1 + S_1\sqrt{\tau'}/\lambda)^{-1} \tag{5}$$

The diffusion length in the active layer, of neutrons in the age group $\tau' = 0$ to $\tau' = \tau_1 - \tau_0$ is assumed constant; it is

$$L_1 = \sqrt{\Lambda_1/3\,\sigma_a^{(1)}} \tag{6}$$

The dimensionless quantity S_1 is the ratio between the active layer average mean free path and diffusion length of first-group neutrons.

$$S_1 = \Lambda_1/L_1 \tag{7}$$

The flux, $(N\nu)_1$ expressed in Eq. 4b, gives the exponential distribution of those neutrons in the active material that have been reflected by the water and have energies corresponding to the age range between τ_0 and τ (i.e., 0 to τ' where $0 \le \tau' \le \tau_1 - \tau_0 \equiv \tau_1'$). By differentiating $(N\nu)_1$ with respect to τ' one obtains the flux between τ' and $\tau' + d\tau'$.

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