

Letter to the Editor

Comments on a Paper Concerning Neutron Diffusion in Light and Heavy Water

In a recent paper, Parks et al.¹ have obtained the diffusion parameters of H₂O and D₂O by measurements of both decay constants at various geometric bucklings and diffusion lengths at various absorptions. Williams has pointed out that for H₂O, data too near the Corngold limit² were included. The largest reported inverse diffusion length, K , was 1.41/cm while the Corngold limit is at 1.49/cm (based on $\sigma_H = 20.36$ b and $\sigma_0 = 3.75$ b). The diffusion parameters for H₂O have been reevaluated over a more restricted range; specifically, values with $\Sigma a > 0.25$ /cm have been omitted. The parameters, except for the poorly determined F coefficient, are unchanged to within a small fraction of the previously assigned errors.

	<u>New</u>	<u>Old</u>
D_0	3.58×10^4 cm ² /sec	$3.57 \pm 0.04 \times 10^4$ cm ² /sec
C	3.35×10^3 cm ⁴ /sec	$3.31 \pm 0.15 \times 10^3$ cm ⁴ /sec
F	0.9×10^2 cm ⁶ /sec	$2.8 \pm 0.7 \times 10^2$ cm ⁶ /sec

¹P. B. PARKS, D. J. PELLARIN, N. H. PROCHNOW, and N. P. BAUMANN, *Nucl. Sci. Eng.*, **33**, 209 (1968).

²N. CORNGOLD, *Nucl. Sci. Eng.*, **19**, 80 (1964).

The effect of transverse leakage on the Corngold limit, as discussed by Williams,^{3,4} was ignored in the earlier report. An investigation disclosed this effect to be less than the uncertainty in σ_S for both the H₂O and D₂O systems, hence negligible. Clearly, however, in smaller systems, the transverse leakage effect cannot be ignored in the assessment of whether a truly unique exponential decay exists.

P. B. Parks
D. J. Pellarin
N. P. Baumann

Savannah River Laboratory
Aiken, South Carolina 29801

M. M. R. Williams

University of London
London, England

December 3, 1968

³M. M. R. WILLIAMS, "The Existence of a Diffusion Length in a Finite Prism of Pure Moderator," *Proc. I.A.E.A. Symp. Neutron Thermalization and Reactor Spectra*, University of Michigan, **1**, 27 (1967).

⁴M. M. R. WILLIAMS, *Nukleonik*, **11**, 219 (1968).