neutron density, coefficients of the same function $J_c(\lambda_m r)$ on both sides of the equation were set equal, from which an infinite set of equations results. If the determinant of these equations is equated to zero, an equation in k results.

The following table gives the values which the multiplication constant must have in order that the pile just be chain reacting, i.e., that its effective multiplication constant be just 1. Naturally the k must be higher for the pile to be chain reacting if the rod is in than if it is out. The figures refer to a pile of 15' radius and 25' height, which is chain reacting without any control rod for a k = 1.0316. k_1 is the multiplication constant necessary if the control rod is black only to thermal neutrons. k_2 is the multiplication constant necessary if the control rod is black for all neutrons. It is naturally higher than k_1. r is the effective radius of the control rod.

r	.0037	.01	.0175	.0336	.0491
k_1	1.0336	1.0363	1.0379	1.0402	1.0419
k_2	1.0367	1.0381	1.0393	1.0415	1.0432

Migration Length - G. N. Plass

The calculation of the migration length in a lattice structure composed of lumps of a multiplying medium in a moderator has been essentially completed. It can easily be shown that the diffusion length is related to the thermal utilization in a lattice extending to infinity in all directions (P_{20}) and the thermal utilization in a lattice of finite size (P_2 which is defined as the absorption of thermal neutrons in U per thermal neutron produced) according to the formula

$$L^2 = \frac{k}{P_{20}} \frac{P_{20} - P_2}{S^2}$$

k is the multiplication factor and $\vec{S} = \vec{i}\frac{\pi}{S_1} + \vec{j}\frac{\pi}{S_2} + \vec{k}\frac{\pi}{S_3}$ where S_1, S_2, S_3 are the lengths of the three sides of the rectangular pile.