

**Q 1.**

Using two-group theory, determine the critical core width of a slab reactor with core composition similar to that of a PWR and surrounded by an infinite water reflector. Use the following data for the core (subscript 1 refers to fast group, subscript 2 refers to thermal group and  $y_0$  and  $z_0$  are the transversal dimensions for a reference cylindrical PWR).

<b>Group</b>	<b>Core 2G</b>		<b>Core 4G</b>				<b>Reflector 2G</b>	
	1	2	1	2	3	4	1	2
$\nu\Sigma_f$	0.008476	0.18514	0.009572	0.001193	0.01768	0.18514		
$\Sigma_a$	0.01207	0.121	0.004946	0.00284	0.03053	0.121	0.0004	0.0197
$D$	1.2627	0.3543	2.1623	1.0867	0.6318	0.3543	1.13	0.16
$\Sigma_R$	0.02619	0.121	0.08795	0.06124	0.09506	0.121	0.0494	0.0197

Table 1: Diffusion theory constants for a typical PWR Reactor Core and Reflector

Other data:

- Fast fission factor (over all energies)  $\epsilon = 1.27$
- Reference PWR diameter  $y_0 = 340$  cm
- Reference PWR height  $z_0 = 370$  cm