



A SEMINAR ON “CALCULATION OF CRITICAL MASS AND THE EIGENVALUE FAST NEUTRON REACTIONS”

DEPARTMENT OF
ENGINEERING PHYSICS
UNIVERSITY OF GAZIANTEP

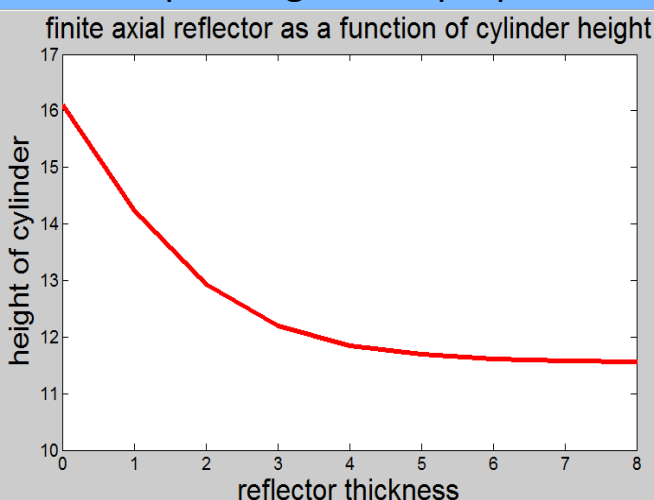
Email:koklu@gantep.edu.tr
Tel :0342 317 22 39

Introduction

One group diffusion equation calculations of bare and reflected reactors in three distinct geometries have great importance in the calculation of the critical mass of the fuel material whether it is pure or mixture. The eigenvalue of the diffusion equation shows the relation between the material and size of the geometry in question. This relation is called the material Buckling, B_m , or the geometric Buckling, B_g , respectively.

Calculations

Solving the steady-state diffusion equation for bare systems one obtains the critical mass of three different geometries as following: $m_{\text{sphere}} < m_{\text{cylinder}} < m_{\text{cube}}$. After covering a bare reactor with a reflector, a reduction is observed in the critical dimensions in all geometries and also the critical mass decreases up to a certain value depending on the properties of reflector and core material.



Geometry	Volume	Critical Volume
Sphere	$\frac{4}{3} \pi R^3$	$\frac{126.63}{B_m^3}$
Finite Cylinder	$\pi R^2 H$	$\frac{148.00}{B_m^3}$
Cube	a^3	$\frac{161.11}{B_m^3}$

Conclusion

Solution of the steady-state diffusion equation gives an idea about the criticality condition for bare and reflected reactors.

Researcher:Res. Assist. Halide KÖKLÜ
Supervisor:Assoc.Prof.Dr Okan ÖZER

Date: 05/06/2012
Place: Seminar Room