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بسم الله الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



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***"Computer Modeling and Burnup Analysis in
Light Water Nuclear Reactors"***

Presented by

Basma Mahmoud Mohammed Fouad

*A Thesis Submitted
to*

Faculty of Science

**In Partial Fulfillment of the
Requirements for
the Degree of
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**Physics Department
Faculty of Science
Cairo University**

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ABSTRACT

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Title of the thesis: **Computer Modeling and Burnup Analysis in
Light Water Nuclear Reactors**

Degree: **Master of Science**

The purpose of this thesis is to study the feasibility of the Thorium/Uranium fuel cycle in heterogeneous Pressurized Water Reactors (PWR) core design. This thesis focuses on the neutronic and burnup analysis of the Thorium/Uranium fuel using the computer codes MCNPX and WIMS-D5. The design is based on the Whole Assembly Seed and Blanket (WASB) concept, in which the individual seed (Uranium) and blanket (Thorium-Uranium) units occupy one full-size PWR assembly in a checkerboard core configuration. The results of the present models are compared with the solution of the benchmark problems. Satisfactory agreement is obtained.

Keywords: Thorium Fuel cycle, Whole Assembly Seed and Blanket, Neutronic calculations

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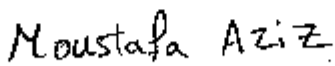
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LIST OF ABBREVIATIONS

AGR	Advanced Gas Cooled Reactor
ANL	Argonne National Laboratory
B _d	Burnup duration
BNL	Brookhaven National Laboratory
BOI	Beginning Of Life
BWR	Boiling Water Reactor
CANDU	Canada Deuterium-Uranium Reactor
CASMO-4	A multigroup transport code for burnup calculations
DOE	Department of Energy
FBR	Fast Breeding Reactor
HTGR	High Temperature Gas Cooled Reactor
IAEA	International Atomic Energy Agency
INEEL	Idaho National Engineering and Environmental Laboratory
K _{eff}	Effective multiplication factor
KTF	Kyung-hee Thorium Fuel
LMFBR	Liquid Metal cooled Fast Breeding Reactor
LWR	Light Water Reactor
LWBR	Light Water Breeding Reactor
MA	Minor Actinides
MCNP	Monte Carlo N-Particle Transport Code System
MCODE	(MCNP + ORIGEN)
MOCUP	(MCNP4B + ORIGEN2)
MIT	Massachusetts Institute of Technology
MEU	Medium Enriched uranium