

A SIMPLE, SMALL AND SAFE NUCLEAR REACTOR
FOR DEVELOPING COUNTRIES

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1. Introduction

A new nuclear reactor design based on the fluidized bed concept is proposed. Present design utilizes spherical fuel of slightly enriched uranium dioxide clad by zircaloy fluidized by light water under pressure. The reactor is modular in system; therefore, any size reactor can be constructed from the basic standard module.

Although safety has always been serious consideration in reactor design, but the reactor concepts were not chosen because they were intrinsically the safety reactors. Most of the present objections to the use of nuclear power have their roots in the reactor safety issue. The approach taken to satisfy the escalating safety concerns has resulted in excessively complex and expensive plant designs while have not succeeded to create public confidence.

There are many proposals made to remedy the problem that presently nuclear energy is facing, but surprisingly the one and the most direct way out of the difficulties; namely, a new reactor concept has been least emphasized. The reason is that many thought that the water reactors are to be used only for a relatively short period of time, since the breeder was expected to take over soon to solve the supposed problem of the limitations of uranium resources. Now the situation has completely changed. It is generally recognized that large scale application of the breeder is not likely until well into the next century. The new resources of uranium and thorium which have been discovered have changed the question of how long uranium resources will last to the question that will they be used in the safe manner or not.

Since the Three Mile Island accident, the reactor safety has been the central issue of the nuclear energy, and the nuclear technologists have been challenged to come up with a new reactor that is "totally safe". The Kraftwerk Union Company of West Germany has come up with "The Modular High-Temperature Reactor" [1] and the General Atomic

