

SYMPOSIUM ON THEORETICAL MODELS FOR PREDICTING IN-REACTOR PERFORMANCE OF FUEL AND CLADDING MATERIAL

FUEL PERFORMANCE MODELS

INTRODUCTION

FUELS II – SPECIAL SESSION ON FUEL PERFORMANCE MODELS

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In the mathematical models of ceramic fuel pin performance that have been formulated to date, the fuel is divided into a number of radial zones, usually three, having different properties and operating conditions. It is assumed that fuel behavior can be adequately characterized in this way for purposes of pin performance modeling.

In this set of papers, emphasis is on the fuel material itself and the phenomena that occur during reactor operation. These include recrystallization and the effects of fission product production, especially the motion of fission gas. The first paper discusses the known mechanisms, and outlines the status of the entire subject. The next four discuss, in different degrees of mathematical detail, processes by which fission gas affects fuel behavior. In the next paper (by Notley) is a detailed evaluation of the interaction between fuel and cladding that illustrates the complexity of the relationships involved. The model described in the final paper covers mechanical and thermal behavior of complete pins, taking into account three dimensional volume variations of fuel. The fuel material under consideration in all papers is oxide, except for inclusion of some data on UC (in the paper by Ritzman et al.).