A PRELIMINARY ANALYSIS OF THE SEFOR DOPPLER COEFFICIENT EXPERIMENTS MADE USING ECCO/JEF-2.2 AND THE ERANOS WHOLE REACTOR SCHEME

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1. INTRODUCTION

The SEFOR fast reactor was built specifically to measure the Doppler coefficient in representative fast reactor spectra. The fuel pins were of large diameter so as to obtain high fuel temperatures at low power levels. Consequently some moderating pins were introduced to soften the spectrum. It was built in two versions one with beryllium oxide diluent pins (SEFOR-1) and the other with steel diluent pins (SEFOR-2). Different types of measurement were made - isothermal, static at different power levels and fast transients. It is the latter two experiments which give the most accurate results and the Doppler constants obtained in the two ways are consistent within the overall uncertainty of about ±15%. (L D Noble et al GEAP 13702, 1972). A detailed description of a calculational procedure is also described by Butland AEEW-R986 .

Simplified calculational models of the reactors have been specified (Hutchins et al 'SEFOR Doppler Benchmark' 1972, CSEWG Benchmark Book) and it is these which have been calculated.

A source of uncertainty in the calculations is the beta-effective value. This has not been recalculated in this preliminary study.

2. CALCULATIONAL MODEL

A simple RZ geometry model of the reactor has been used in these first calculations. SEFOR-1 has been calculated in both homogeneous and heterogeneous versions while SEFOR-2 has only been calculated in the homogeneous version. The ECCO cell code has been used to prepare the cross-sections for the ERANOS whole reactor calculations.

1 RESULTS

The preliminary result for SEFOR-1 is :

SEFOR-1 (heterogeneous model) C/E = 0.91 (± 0.15)