ENGINEERING

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ABSTRACTS

Prediction of PWR Reactivity Coefficients Using LEOPARD. Raydo Bugayong, St. Joseph's College, Rensselaer, Indiana 47978.——In the process of licensing nuclear power reactors, the reactor vendors and utilities are required to predict as well as measure reactivity coefficients and to report these in the Preliminary Safety Analysis Report. In doing this, the vendors expend considerable time and effort using sophisticated computer codes. The main objective of this paper is to determine the relative accuracy obtainable in predicting certain reactivity coefficients by using a relatively simple and (more importantly) readily available computer code named LEOPARD.

The particular reactivity coefficients of interest are the moderator temperature coefficient, Doppler coefficient and the soluble boron reactivity worth. It has been observed that the reactivity coefficient predictions are significantly dependent upon the fuel temperature calculation models used. In particular, the effective resonance temperature model and gap conductance model, of which there are several, can have a significant effect on the predicted reactivity coefficients. Inspite of the above limitations however, LEOPARD calculations, especially the boron reactivity worth and moderator temperature coefficients are shown to agree reasonably well when compared to the WUP PSAR. This is also true with the prection of the Doppler only power defect and the total power defect. Hence, these results show that by arriving at an appropriate fuel temperature calculation model, the LEOPARD code can predict the above mentioned reactivity coefficients reasonably well.

On the Need for Engineers Trained in Biotechnology. David D. Chesak, St. Joseph's College, Rensselaer, Indiana 47978.——Recent advances in the biological sciences promise to revolutionize many industries as well as promote entirely new ones. For example, the latest development, popularly referred to as genetic engineering, has been applied to the production of human insulin using a bacterial vector. It is anticipated that food processing, energy supply, pharmaceutical manufacturing, synthetic material production, waste recycling and fertilizer manufacture are some of the areas that will be impacted. As these changes come about, there will be a need for people who have training in microbiology, biochemistry, fermentation technology and chemical engineering. At present, very few universities offer a bachelor of science degree program that incorporates all of these disciplines. It is felt that, to meet the future needs of our society, we should consider now curricula of this type.

The Viscosity Determination of a Non-Newtonian Fluid. Robert H. L. Howe, West Lafayette, Indiana 47906 and David J. Howe, Columbia, Missouri 65201.——The procedure for determining the viscosity of a heavy bio-oxidation substrate is presented. The mathematical relationship of the viscosity and the rotational speed is derived. Some experimental data are illustrated.