PACKAGE ID - 000618I036000 MARGE/SLUMP

KWIC TITLE - Maximum Temperature LMFBR Fuel Pin

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LIMITATION CODE -UNL **AUDIENCE CODE -** UNL

COMPLETION DATE - 07/01/1975 **PUBLICATION DATE -** 07/01/1975

DESCRIPTION - The MARGE/SLUMP code performs a series of one-dimensional (radial) calculations at fixed intervals along the axial length of a LMFBR fuel element to determine sodium temperature, clad temperature, fuel temperature, central void diameter, and amount of fuel addition or removal necessary to maintain the inner surface of the central void at the melting temperature of mixed oxide fuel.

PACKAGE CONTENTS - Media Directory; Software Abstract; Sample Problem Output; MARGE/SLUMP, A Computer Code for Predicting Maximum Temperature or Melting Fraction in a LMFBR Fuel Element from W.W. Marr (9 Pages); Media Includes Source Code, Sample Problem Input;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - Calculation of coolant temperature, initial temperature differentials across the fuel element clad and the gas bond region, and the temperature field within the fuel, are based on a chopped cosine power distribution. Volumetric heat generation rate is assumed to be proportional to the local fuel density. Geometry of the initial density, equiaxed and columnar grain growth regions are determined by integration of the mixed-oxide thermal conductivity correlation between the temperature bounds for the model being used. Fuel slumping after melting is determined from calculations involving the decrease of fuel in the upper portion of the fuel column until the central void inner-surface temperature equals the fuel melting temperature and the corresponding increase in amount of fuel in the lower portion until the central void inner-surface temperature equals the melting temperature or the void is completely filled.

COMPUTER - IBM360

OPERATING SYSTEMS - OS/360,370

PROGRAMMING LANGUAGES - FORTRAN IV

SOFTWARE LIMITATIONS - In the present version, fuel relocation results must be processed manually.

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SOFTWARE LIMITATIONS -(CONT)
SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - MARGE/SLUMP takes into consideration the temperature dependence of clad thermal conductivity, and a variable fuel-clad gap conductance that is specified for each axial level. Five mixed-oxide fuel models describing fuel thermal conductivity and restructuring parameters (GE, AI, Karlsruhe, W, and FFTF) are options within the code. Two options exist to describe the downward slumping of molten fuel: (a) the central void fills completely in the lower portion of the fuel pin, or (b) a fuel bridge forms at the location where the molten fuel can solidify to the center.

HARDWARE REQS - 240K bytes of core

TIME REQUIREMENTS - Compilation time is 6 seconds, and execution of the sample problem takes 1 second.

REFERENCES - D.H. Thompson and W.W. Marr, Prediction of Maximum Temperature or Melting Fraction in a LMFBR Fuel Element, Nuclear Engineering and Design, Vol. 17, pp. 361-370, 1971; W.W. Marr, MARGE/SLUMP, A Computer Code for Predicting Maximum Temperature or Melting Fraction with Fuel Relocation in a LMFBR Fuel Element, ANL Note, March 28, 1975.

ABSTRACT STATUS - Abstract first distributed July 1975. IBM360 version submitted April 1975, sample problem executed by NESC July 1975 on an IBM370/195.

SUBJECT CLASS CODE - H

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
M CODES
LMFBR TYPE REACTORS
THERMAL ANALYSIS
FUEL PINS

EDB SUBJECT CATEGORIES -
990200 220300 420400 210500

SPONSOR - DOE/NE

PACKAGE TYPE - TESTED