

PACKAGE ID - 000621GE63500 VELVET2

KWIC TITLE - Turbulent Flow in LMFBR Rod Bundle

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

COMPLETION DATE - 04/01/1970 **PUBLICATION DATE** - 04/01/1970

DESCRIPTION - VELVET2 solves the coupled, heat-transfer equations in the fuel, gap, cladding, and coolant for a triangular-spaced, close-packed, fuel rod bundle with liquid metal coolant. The model includes temperature-dependent material properties, turbulent velocity distribution in the coolant, and contributions to coolant heat transfer by turbulent mixing.

PACKAGE CONTENTS - Media Directory; Software Abstract; GEAP-10052;
Media Includes Source Deck, Sample Problem Output;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - VELVET2 integrates the coupled equations in the fuel, gap, cladding, and coolant. The gap, cladding, and coolant employ a nodal model which is coupled to an approximate analytic solution in the fuel. The velocity field is calculated from the model of Ibragimov, which considers the effect of the irregular flow geometry on the turbulent structure of the flow. The eddy diffusivity of heat is assumed to be related to the eddy diffusivity of momentum through the correlation of Dwyer, and thus becomes a point function in the coolant channel and describes turbulent heat transfer in both the radial and circumferential directions.

COMPUTER - GE635

OPERATING SYSTEMS - GECOS

PROGRAMMING LANGUAGES - FORTRAN IV

SOFTWARE LIMITATIONS - Maxima of - 10 radial divisions in the fuel, 5 radial divisions in the clad, 10 radial divisions in the coolant between the outer edge of the buffer layer and one-half the pitch, 10 circumferential divisions

SOURCE CODE AVAILABLE (Y/N) - Y

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RELATED SOFTWARE - VELVET2 is a second-generation version of the original VELVET work.

HARDWARE REQS - 32K memory

TIME REQUIREMENTS - About 5 seconds are required for a typical problem.

REFERENCES - D.J. Bender and P.M. Magee, Turbulent Heat Transfer in a Rod Bundle with Liquid Metal Coolant, GEAP-10052, July 1969; M.Kh. Ibragimov, et al., Calculations of the Tangential Stresses at the Wall of a Channel and the Velocity Distribution in a Turbulent Flow of Liquid, Atomnaya Energiya, Vol. 21,p. 101, 1966\ O.E. Dwyer, Eddy Transport in Liquid-Metal Heat Transfer, American Institute of Chemical Engineers Journal, Vol. 9, p. 261, 1963; VELVET2 Subroutine Descriptions including - ISERVE, GE 635 Computer Service Function, FSUP and FSUPC, FORTRAN Output Suppress Function, and FSNOW, Save File Code Function.

ABSTRACT STATUS - Abstract first distributed January 1972. GE635 version submitted April 1970.

SUBJECT CLASS CODE - H

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
V CODES
FUEL RODS
FUEL ELEMENT CLUSTERS
LMFBR TYPE REACTORS
TURBULENT FLOW
HEAT TRANSFER
THERMAL ANALYSIS

EDB SUBJECT CATEGORIES -

990200 210500 220300 420400

SPONSOR - DOE/NE

PACKAGE TYPE - AS - IS