Abstracts of Japanese Articles

To cite this article: (1978) Abstracts of Japanese Articles, Journal of Nuclear Science and Technology, 15:10, 795-796, DOI: 10.1080/18811248.1978.9735592

To link to this article: https://doi.org/10.1080/18811248.1978.9735592

Published online: 15 Mar 2012.

Article views: 31

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ABSTRACTS OF JAPANESE ARTICLES
in NIHON-GENSHIRYOKU-GAKKAI SHI
(Journal of the Atomic Energy Society of Japan)

Vol. 20, No. 10, (October 1978)

(Exposition) Linear Accelerators of Heavy Elements: By Masatoshi ODERA (Received Aug. 12, '78), pp. 682-687.

(Exposition) INFCE and Its Overview: By Kunihiko UEMATSU, Kunihiko NAKAMURA (Received Aug. 31, '78), pp. 688-693.

(Exposition) Electronic Structure of Actinide Metals and Semimetals: By Shosuke IMOTO (Received Sep. 7, '78), pp. 694-702.

(Exposition) Expression of Radiation Units under International System of Units: By Osamu YURA (Received Sep. 4, '78), pp. 703-706.

(Technical Data) Operating Experience at Ikata Nuclear Power Plant: By Toshiaki SHIGEMOTO (Received Aug. 11, '78), pp. 707-709.

Ikata Nuclear Power Station Unit-I was built at the first nuclear power plant of Shikoku Electric Power Co. at Ikata-cho, Ehime Prefecture. Commercial operation at full power continued since Sep. 30, 1977, and the plant was shut down on Mar. 28, 1978 for the first annual inspection. Here is the profile of the plant and its operating experience.

(Technical Data) Progress Report on NSRR Experiments, (II), LWR Fuel Failure under Reactivity Initiated Accident Condition in Ambient Temperature and Pressure Coolant, (2): By Michio ISHIKAWA, Tsutao HOSHI, Nobuaki ONISHI, Shinzo SAITO, Toruio YOSHIMURA (Received May 31, '78; Revised Aug. 7, '78), pp. 710-717.

The NSRR Program is in progress in JAERI to investigate the fuel behavior under reactivity initiated accident conditions. This report presents the outline of the NSRR Program activities in 1977. Emphasis was placed in the fuel design parameter tests in this period. The enrichment parameter tests and the pre-pressurized fuel tests were nearly completed. Data for the effects of power generation profile on incipient failure and for the effect of initial internal pressure on fuel behavior during rapid transient were provided. The experimental results of the water-logged fuel tests, coolant temperature parameter tests, flow shroud tests and others are summarized.

(Short Note) Characteristics of Separation Cell with Two Kinds of Membrane Differing in Gas Permeability Tendency: By Osamu OZAKI, Hideaki HEKI, Masayoshi OHNO (Received Jan. 12, '78; Revised Sep. 11, '78), pp. 723-725.

(Original Paper) Algorithm for Optimal Reactor Shutdown Problem by Branch and Bound Method: By Akio MIYAKOSHI, Azuma OOUCHI, Ikuo KAJI (Received Dec. 26, '77), pp. 726-733.

This paper gives an algorithm for the optimal reactor shutdown problem in which the control input is constructed by pulse sequences. We consider this problem a combinational one and apply the branch and bound method to find the optimal control sequences. From the property of the model, the optimal solution can be found by searching only half branches of the tree and an optimal control set of this problem can be determined completely. We confirmed that the algorithm is effective from the results of numerical experiments.
Effects of Cesium-137 Distributions in Fuel Bundle on Intensity of Gamma-Ray in Gamma Scan Method

By Fuminobu TAKAHASHI

(Received Feb. 7, '78; Revised July 10, '78, pp. 734-742.)

This paper presents numerical estimation of the relation between measured intensity 662 keV γ-ray and nonuniform distributions of 137Cs in a γ-scan of a 7 × 7 fuel bundle without disassembling.

In the present analysis, the intensity of 662 keV γ-ray measured on the bundle is calculated as a function of the γ-ray measurement angle which is defined as an angle between the central axis of a collimator of a γ-ray detector and the line normal to a wall of the channel box.

In the calculation, the local distribution of 137Cs in the bundle is treated as power distributions obtained by calculation at the uncontrolled bundle and at the controlled bundle. The distribution of 137Cs in a fuel rod is assumed to be parabolic in radial directions.

The present numerical analysis shows that the content of 137Cs can be estimated from the intensity of 662 keV γ-ray at a measurement angle of 27° with an error of less than 0.7%, provided that the local distribution of 137Cs is known and the distribution of 137Cs in fuel rods is parabolic.

The analysis also shows that the extent of 137Cs can be estimated from the intensity of 662 keV γ-ray at a measurement angle of 24° with an error of about 3.7% when the local distribution of 137Cs is unknown.