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Application of Nano-indentation Method to Statically Evaluate Irradiated Materials

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1. Introduction

Considering the limited test conditions, facilities and wastes of irradiation study, it is necessary to find a method to estimate various mechanical properties using small specimen. Recently, nano-indentation method has been proposed based on the measurement of micro-hardness which is in function of indentation depth for a given indenter shape. In this study, a method to evaluate mechanical properties at the nano-scale was proposed and applied to evaluate the mechanical properties of irradiated materials.

2. Experimental method

The specimen is received 15Cr2NHFA steel made by Russia. The sample was nano-indented and irradiated after installed in an instrumented capsule of a research reactor, HANARO. The Specimens in a capsule were irradiated in IR-2 hole of HANARO under 242 MWD which temperature and neutron flux were about 316 ℃ and 8.05×10^{19} ncm^{-2}, respectively.

3. Results

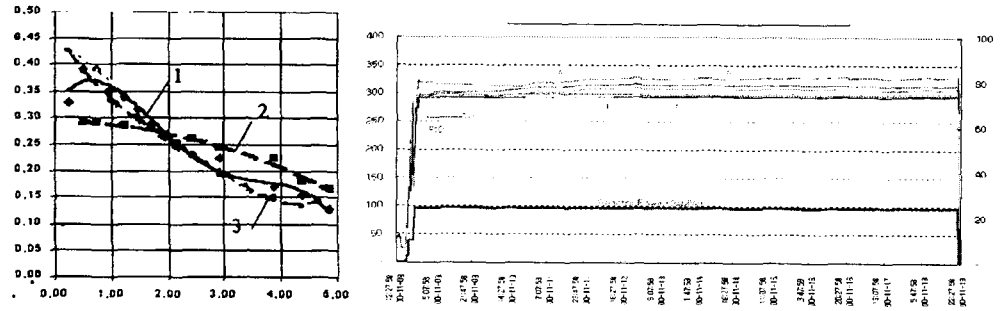

Fig. 1 (left) Dependance of variation V with print size h, (right) average temperature during irradiation test

4. Summary

The statistical characteristics V*(h)* and G*(h)*of micro-hardness measurements in function of print depth allow to make distribution histograms of the phase size. The volumetric particle share,is equal to difference *Nc/N*. The specimen irradiated in 00M-01U capsule which was installed in IR2 hole of HANARO under 242 MWD which temperature and neutron flux were 16 ℃ and 8.05×10^{19} ncm^{-2}, respectively and are in IMEF.

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