

Revealing of the Wave-Like Process in Kinetics of the Structural Steel Radiation Degradation

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Abstract : Dependence of the materials properties on neutron irradiation intensity (flux) is a key problem while usage data of the accelerated materials irradiation in test reactors for forecasting of their capacity for work in realistic (practical) circumstances of operation. Investigations of the reactor pressure vessel steel radiation degradation dependence on fast neutron fluence (embrittlement kinetics) at low flux reveal the instability in the form of the scatter of the experimental data and wave-like sections of embrittlement kinetics appearance. Disclosure of the steel degradation oscillating is a sign of the steel structure cyclic self-recovery transformation as it take place in self-organization processes. This assumption has received support through the discovery of the similar 'anomalous' data in scientific publications and by means of own additional experiments. Data obtained stimulate looking-for ways to management of the structural steel radiation stability (for example, by means of nano - structure modification for radiation defects annihilation intensification) for creation of the intelligent self-recovering material. Expected results: - radiation degradation theory and mechanisms development, - more adequate models of the radiation embrittlement elaboration, - surveillance specimen programs improvement, - methods and facility development for usage data of the accelerated materials irradiation for forecasting of their capacity for work in realistic (practical) circumstances of operation, - search of the ways for creating of the radiation stable self-recovery intelligent materials.

Keywords : degradation, radiation, steel, wave-like kinetics

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