ANALYSIS OF NUCLEAR COMPONENTS INTEGRITY FOR LTO USING FAD

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In the current conditions of Ukraine, it is essential to have a sufficient amount of electricity. While a nuclear fleet provides about 50% of all electrical power generation, most of the plant's power units operate beyond their designed lifetime. Safe long-term operation is a complex and extensive task, one factor of which is the assessment of the brittle strength of the equipment. On the other hand, components can collapse by a plastic mechanism, which must also be considered. Bearing in mind that we need to calculate a lot of postulated cracks, it would be beneficial to have a fast and robust tool capable of replacing FEA for routine brittle fracture evaluation in typical components.. Additionally, evaluating brittle strength necessitates postulating cracks at all potential locations of stress concentrators, and reconfiguring the mesh with subsequent verification poses challenges. Therefore, for such an assessment, one can utilize special software, like "SIF-Master", whose calculation method is grounded in the API 579 standard and employs its own formulas based on the weight function method. A unique aspect of calculating the stress intensity factor using the weight function method is the incorporation the entire stress field on the crack surface. This simplifies the task of calculating surface, underclad and embedded cracks in the equipment. Furthermore, by utilizing the "SIF-Master" software, we can determine the safety margin at the crack postulation sites for both stationary and non-stationary (emergency) loading conditions using failure assessment diagram (FAD). In summary, "SIF-Master" facilitates a quick and accurate assessment of cracks in the equipment of a nuclear power plant, which helps predict the safety margin and allowable operating time.

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