Assessment of Long-Term Structural Changes in a VVER-1000 Reactor Flange Stud

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Abstract. The long-term operation of nuclear power plants depends on the properties of the components' structural materials and their resistance to radiation, corrosion, and thermo-mechanical strains for longer than 60-80 years. The integrity of primary circuit components is essential to ensure high nuclear safety. This paper studies microstructural changes in a reactor flange fastening system, especially in a flange stud and nut exposed to irradiation and a gradually varying thermo-mechanical load. The investigated flange stud and nut originate from a Ukrainian VVER 1000 reactor and were analysed through the DELISA-LTO project with the aim to evaluate the long-term resistance of the primary circuit components in VVER technologies.