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【715】 Neutron radiography investigations of cladding tube materials under interim dry storage conditions

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Zirconium alloys are used as nuclear fuel cladding material, but hydrogen is taken up by the cladding during operation and precipitates during cooling. During interim dry storage the cladding tubes are affected by mechanically and thermally induced stresses. In order to investigate zirconium and cladding tubes at similar conditions, we observe in-situ the hydrogen diffusion in dependence of its solubility and elastic tensile stresses. For this purpose, a facility is used that allows tensile tests at different temperatures when installed in neutron beamlines. It is advantageous to use Neutron Radiography for the metal zirconium, because of its very low neutron cross section that, contrarily to hydrogen, attenuates neutrons only weakly.

Theoretical Work

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