

Thermo-Hydraulic Model of the S-Allegro Helium Experimental Loop

Boris Kvizda^{1, a)}

¹ VUJE, a.s., Okružná 5, Trnava, 91864, Slovak Republic

^{a)} Corresponding author: boris.kvizda@vuje.sk

Abstract. The experimental facility S-Allegro is part of a key research infrastructure supporting the advancement of Gas-cooled Fast Reactor nuclear technology, one of the six reactor concepts promoted by the Generation IV International Forum. The S-Allegro, an integral test facility, operated by CVR in Plzen, Czechia, is designed as an electrically heated, scaled-down version of the ALLEGRO GFR demonstrator being developed within the V4G4 Centre of Excellence consortium. The S-Allegro ITF is intended for testing of critical systems and components of GFR technology, including the Decay Heat Removal system, gas-to-gas heat exchangers, emergency nitrogen injection system, and others. In addition, the facility enables the investigation of both operational and accident conditions and provides experimental data for the validation of computational tools and models used in ALLEGRO GFR demonstrator development. This paper presents the development and qualification of a thermo-hydraulic model of the S-Allegro implemented in the CATHARE2 system code within the SIMONA project. The newly developed CATHARE2 model is intended to replace the previously used RELAP5-3D model. The developed CATHARE2 model demonstrates reasonable agreement with experimental data under steady-state conditions, confirming its suitability for further scaling analyses.