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| Abstract | Ballistic flight phases for cryogenic upper stages impose the need to analyze the sloshing behaviour in the propellant tanks, taking into account the RCS manoeuvres as well as the temperature evolution. A tool was therefore developed which enables a closed loop analysis of the stage behaviour, taking into account the stage controller as well as the fluid dynamics in the tank. In addition a coupling of the propellant thermodynamics in the tank, modelled with the CFD tool FLOW-3D, and the thermodynamics of the stage structure, modelled with the tool ESATAN, was set up. First steps concerning a verification of the tool were conducted. The strong interaction between propellant sloshing in the tanks and the RCS thruster activations show the need to take a coupling between rigid body motion and the fluid dynamics into account. |