Fluids and Space Engineering Seminar

Date: Thursday, November 30, 2023 at 14:15 h
Location: ZARM, Room 1730

Experimental and Theoretical Investigations of the Physical Processes Related to the Retention Capability of a Double Screen Element against Liquid Hydrogen

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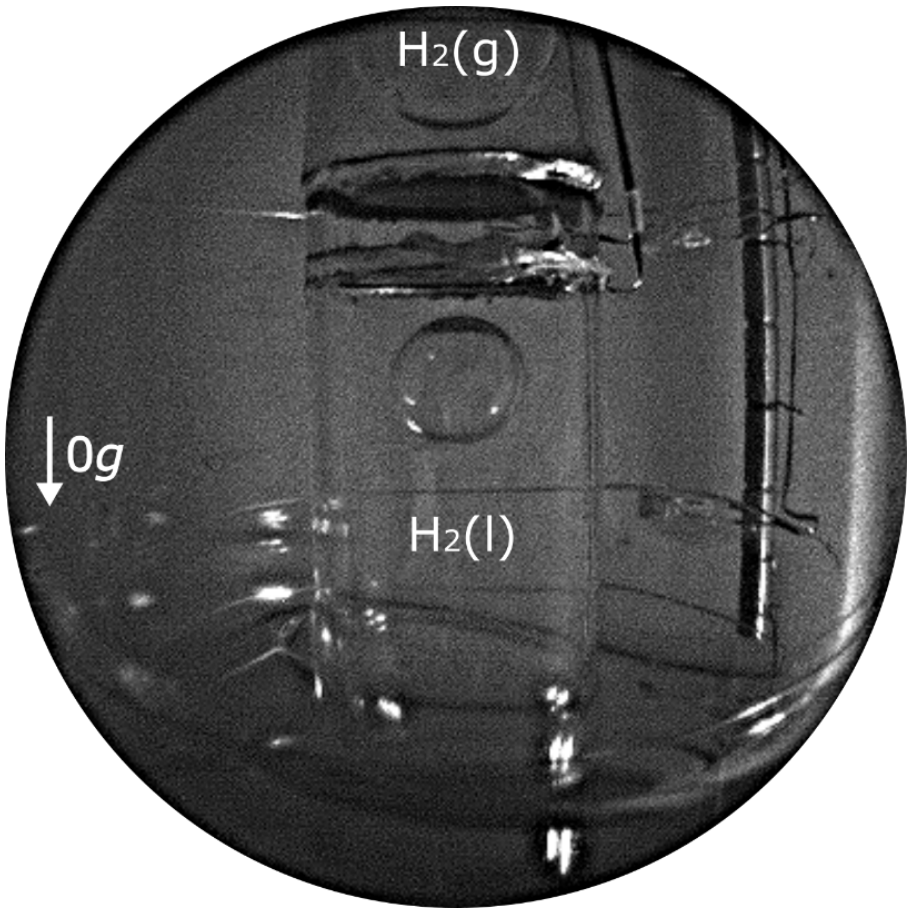

Metal screens are commonly used as components for fluid handling in spacecraft and rocket tank designs. In most cases, the screens perform a passive separation of the propellant phases. The separation of the liquid from the gaseous propellant phase, is a special challenge. Liquid-gas phase separation means that the gaseous phase is allowed to enter a phase separation device while the liquid phase is blocked. The technical application of this process is the depressurization in a propellant tank. A certain amount of the gaseous propellant phase is vented from the tank through the gas port. The liquid propellant phase remains in the tank in order to be stored for the engine. However, if the tank causes a liquid movement during the depressurization, a part of the liquid can potentially enter the gas port. In order to prevent the unwanted liquid outflow, a separation of the liquid from the gas is necessary. This is possible with the aid of a double screen and has already been performed for storable liquids in microgravity. At the current state of the art, the separation of the liquid from the gaseous phase of the cryogenic propellant hydrogen using a double screen has not been performed in microgravity. However, with regard to a possible application, it is mandatory to investigate the function of the double screen element for the real propellant under relevant environmental conditions. Therefore, this work focuses on the experimental and theoretical investigation of the retention capability of a double screen against liquid hydrogen.