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C1Or2A-02: Numerical study of a consequence of a vacuum insulation degradation in a cryogenic system

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Vacuum is the primary method for a thermal insulation of cold elements in cryogenic systems, tanks and other cryogenic equipment. A dangerous situation arise in the case of vacuum envelope failure when a 300 K air enters the vacuum and the cold elements of cryogenics equipment are exposed to a potentially intense heat fluxes and air velocity. Depending on a mass flow of the air (equivalent to size of an insulation rapture), a different rate of the temperature and pressure growth in the vacuum chamber can promote various mechanisms of the heat transfer to the cold elements. Additionally, it can be limited by the air condensation and cryosorption. In the present work a simplified numerical model of a typical cryogenics system is developed and different scenarios of vacuum degradation are considered. The current studies aim to identify the development of the different thermal conditions in the cryogenics system in the function of the mass flow of the ventilating air.

Authors: MALECHA, Ziemowit (Wroclaw University of Technology); POLINSKI, Jaroslaw (Wroclaw University of Technology); Mr KOPCZYNSKI, Aleksander (Wroclaw University of Science and Technology); Mr BARAN, Blazej (Wroclaw University of Science and Technology)

Presenter: MALECHA, Ziemowit (Wroclaw University of Technology)

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