Measurement of Temperature Fields in Metal Hydride Storage Container

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The article analyses the measurement with increased absorption kinetics of hydrogen into the La0.85Ce0.15Ni5 alloy. Within a time interval of 180 s an amount of 0.142 kg (1.58 m³) of hydrogen was absorbed into 56 kg of alloy. The process of absorption was accompanied by an increased temperature of the bed. Therefore it was simultaneously cooled by a cooler using Peltier elements. The numerical calculation of non-stationary heat transfer within the bed was performed with a known amount of heat generated in the bed, known temperatures and flow rates. Simulation results allow us to determine temperature time paths at key points of the bed and give insight on the transient phenomena which occurs in the extreme load of the metal hydride (MH) bed. The temperature field is analyzed for different values of thermal conductivity, view of its change during the lifetime of metal hydride. This allows establishing safe limits for the absorption of hydrogen into a particular alloy.

Keywords: Measurement, temperature field, numerical simulation, Ansys CFX, metalhydride, hydrogen.

Acknowledgments

This paper was written with the financial support of the granting agency KEGA of the Ministry of Education of the Slovak Republic within the project solution No. 041 TUKE-4/2013, of the granting agency VEGA of the Ministry of Education of the Slovak Republic within the project solution No. 1/0686/13.

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Paper number: M2015140
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