Effect of variable thermal conductivity and specific heat capacity on the calculation of the critical metal hydride thickness for Ti1.1CrMn - DTU Orbit (08/11/2017)

Effect of variable thermal conductivity and specific heat capacity on the calculation of the critical metal hydride thickness for $Ti_{1.1}CrMn$

High pressure metal hydrides have been recently considered as one of the most promising hydrogen solid storage options for on - board applications. Unfortunately the high purchasing costs related to these materials and the complexity related to building a scaled high pressure tank system with activated powder and embedded heat exchanger makes difficult to set up experimental facilities. Trustable simulation models that can address the system´s performances to a particular design are then a funda mental step to be taken prior any experimental setup. This study considers a detailed 1D fueling model is applied to the metal hydride system, with $Ti_{1.1}CrMn$ as the absorbing alloy, to predict the weight fraction of absorbed hydrogen and solid bed temperat ure . Dependencies of thermal conductivity and specific heat capacity upon pressure and hydrogen content respectively , are accounted for, by interpolating experimental data. The effect of variable parameters on the critical metal hydride thickness is invest igated and compared to results obtained from a constant parameter analysis . At the end , the discrepancy in the metal hydride thickness value is estimated around 10%

General information

State: Published
Organisations: Department of Mechanical Engineering, Thermal Energy
Authors: Mazzucco, A. (Intern), Rokni, M. (Intern)
Pages: 1025-1033
Publication date: 2014

Host publication information

Title of host publication: Proceedings of the 20th World Hydrogen Energy Conference (WHEC 2014)
Main Research Area: Technical/natural sciences
Conference: 20th World Hydrogen Energy Conference 2014, Gwangju Metropolitan City, Korea, Republic of, 15/06/2014 - 15/06/2014
Hydrogen solid storage, Metal hydrides, 1D numerical model, High-pressure storage tank, Heat exchanger
Electronic versions:

WHEC2014_PAPER_Andrea_Mazzucco.pdf
Source: PublicationPreSubmission
Source-ID: 118269817
Publication: Research - peer-review › Article in proceedings – Annual report year: 2015