THE SAFE STORAGE OF GASEOUS FUEL IN A COUPLED STATE: II. CFD MODELING OF THE ADSORBER WITH HEAT PIPE

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Abstract

Adsorbed Natural Gas (ANG) storage technology is a viable alternative to compressed gas having higher energy density, less extreme operating conditions and less danger of explosions. One of the central problems in extensive application of the adsorption storage systems of a gaseous fuel consists in improving the efficiency of fueling process. The perspective device to perform a adsorbent bed thermal control during its charging/discharging is heat piper. In this work CFD model (ANSYS Fluent) of the cylindrical adsorber with internal finned heat pipe is suggested and used for the parametric study of dynamic behavior of methane storage system. The fueling characteristics will be presented for constant mass flow rate and constant pressure of the methane at the inlet of the adsorber. In the supercritical temperature region modified thermal coefficient of limiting adsorption and Dubinin–Astakhov equation are proposed for the prediction of the isotherms and isosteric heat of adsorption.