Cover letter

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Our work “Numerical heat and mass transfer inside a porous ceramic tank” is dedicated to the numerical simulation of temperature, saturation and pressure evolutions inside a porous ceramic-based reservoir. To simulate these transport phenomena, a 3-D unstructured Control Volume Finite Element Method (**CVFEM**) is employed, in conjunction with the utilization of a free mesh generator called **Gmsh**. The study showcases numerous simulation results that depict the transport phenomenon, such as the three-dimensional distribution of temperature, liquid saturation and pressure during the heating of the ceramic tank. By employing this numerical model, a more comprehensive comprehension of these transport phenomena can be achieved. We perform a thermal study on a porous ceramic tank to analyze how it transfers heat in relation to its surrounding environment. This investigation involves studying the distribution of heat and mass within the tank. Furthermore, we evaluate how three important factors - saturation, porosity, and air velocity - affect the tank's thermal efficiency. The results obtained from this study are crucial in assessing the suitability of the ceramic tank for its intended application and aiding in the development of an effective insulation system to minimize heat loss or gain.