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Pore-scale digital twin of sorption thermal energy storage in packed bed reactor using a machine-learning assisted dual-network model

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The adsorption thermal energy storage system is widely utilized for low-grade heat storage and recovery due to its environmentally friendly and efficient characteristics. In this work, we utilized a machine-learning assisted dual-network model to construct an upscaling model from micro-kinetics to reactor in order to simulate an adsorption heat release process involving heat and mass transport on a meter-scale packed bed reactor. The simulation results were compared with experimental measurements and analytical models to demonstrate the accuracy of the model in predicting temperature and concentration distribution within the system. Subsequently, we explored the impact of different boundary conditions on the internal state parameters during the adsorption heat storage process, offering valuable insights for the design of adsorption heat storage systems.

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References

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