

粒径および熱物性が多孔質体中の熱分散現象に与える影響
Effects of particle size and thermal properties on thermal dispersion characteristics in porous media

万代 俊之^{1*}; 濱本 昌一郎¹; 井本 博美¹; 西村 拓¹; 小松 登志子²

BANDAI, Toshiyuki^{1*}; HAMAMOTO, Shoichiro¹; IMOTO, Hiromi¹; NISHIMURA, Taku¹; KOMATSU, Toshiko²

¹ 東京大学大学院農学生命科学研究科, ² 埼玉大学大学院理工学研究科

¹Graduate School of Agricultural and Life Sciences, the University of Tokyo, ²Graduate School of Science and Engineering, Saitama University

Understanding heat transport process in saturated porous media is essential, in regard to a widespread use of ground source heat pump systems and design of geologic repositories for high-level nuclear wastes. However, knowledge of thermal dispersion occurred due to advective heat flow is limited in the mechanisms of heat transport process. In this study, one-dimensional heat and solute transport experiments were conducted using glass beads with different size fractions, and stainless steel sphere with high thermal conductivity. Effects of particle size, thermal properties, and flow velocities on thermal dispersion characteristics and the difference between thermal and solute dispersion characteristics were discussed based on the column experiments. Glass beads with smaller size fraction showed smaller increase in thermal dispersion coefficient at higher flow velocity as compared to the one with larger size fraction. Flow velocity dependency on thermal dispersion coefficient was insignificant for stainless steel sphere, indicating thermal conduction dependent heat transport is dominant in the column due to higher thermal conductivity of the stainless steel.

キーワード: 熱分散, 溶質分散, 熱物性

Keywords: thermal dispersion, solute dispersion, thermal properties