マイクロフォーカスX線CT装置を用いた間隙構造の解析

Analysis of soil macro pore network by Micro-focus X-ray CT system

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Soil has important role for water, gas, and heat transport. To understand mass transport properties in soil is essential for having effective remediation for contaminated soil and groundwater, and conservation of natural and agricultural lands. The mass transport properties can be controlled by soil macro pore network. In recent years, visualization technique for soil macro pore network by using a micro-focus X-ray CT system have been markedly developed and many studies using the system have already been carried out. However, previous studies have mainly focused on a sand with simple grained structure and analysis of undisturbed soil has not been conducted sufficiently. Therefore, the objectives of this study were to investigate relationship between mass transport parameters and soil macro pore network based on analysis using Micro-focus X-ray CT system. In this study, intact soil samples were taken from orchard land in New Zealand and the samples were used.
Statistical data were acquired after using Micro-focus X-ray CT system and the data were finally processed as average and standard deviation data. For example, tortuosity that is one of the important mass transport parameters in soil, was obtained from two different methods. One was calculated based on measured gas diffusivity and the other one was calculated by analysis using Micro-focus X-ray CT system. These calculated values showed almost same tortuosity. The value of mass transport parameter increased with having more complex soil macro pore network.

キーワード：マイクロフォーカスX線CT装置、不攪乱土、間隙構造
Keywords: Micro-focus X-ray systen, undisturbed soil, macro pore network

