



Plant-soil interaction

Roots are crucial for keeping the soil together and preventing erosion. And the soil is required to keep the moisture needed for the plants to grow. The interaction between the roots and the partially saturated soil is therefore important to study to understand how differences in global temperature and weather can influence the stability of soils and survivability of plants.

This project will study the interaction between the soil and the roots that transport water (and nutrients) from the soil to the leaves of the plants. Specifically, the roots can be considered as a fully saturated porous medium with a suction from the leaves in the tree, while the soil will be partially saturated causing, making it hygroscopic.



Figure 1: Intricate root systems (credits: www.vecteezy.com)

This project aims to simulate the water transport in a two-phase material consisting of roots and soil using the Finite Element package Ferrite.jl. The project has four main steps,

- Considering both soil and roots as fully saturated, solve the Darcy flow problem.
- Include interface conditions, i.e. an additional resistance of transport between the soil and roots.
- Consider the highly nonlinear problem when considering a partially saturated soil and do a parameter study to investigate the influence of e.g. suction from the tree, interface conditions, and permeability in the roots and soil.

Technische Universität Braunschweig
Institute of Applied Mechanics
Pockelsstraße 3
38106 Braunschweig

Prof. Dr.-Ing. Ralf Jänicke

www.tu-braunschweig.de/iam

Contact

Dr. Knut Andreas Meyer
k.a.meyer@tu-bs.de