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Simulation of water transfers at the Soil-Plant-Atmosphere interface in unsaturated soil

Atmospheric conditions such as air temperature, wind speed, evapotranspiration, and relative humidity have an influence on the surface soil moisture. This communication presents a modelling of water transfers in unsaturated soil, as well as the numerical simulation of these transfers. The model takes into account the physical and hydrodynamic characteristics of unsaturated soils that interact with atmospheric parameters. Literature research has contributed to the development of a physical model and a mathematical model based on mass and energy transfers as well as the thermodynamics of irreversible processes. The results obtained allow for predicting, using a computational code, the spatiotemporal evolution of soil water content based on atmospheric conditions and physical characteristics (density, porosity, particle size) as well as soil hydrodynamics (desorption isotherm, soil-water characteristic curve, saturated permeability, unsaturated permeability). Understanding the evolution of this water content over time and space is important data that contributes to optimal plant water management.

Keywords: Atmospheric conditions, Surface soil moisture, mathematical modelling, simulation, hydrodynamics

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