



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: **Experimental and Numerical Evaluation of Flow beneath Mini Disc Infiltrometer for Estimating Wetting Characteristics of Soils**

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SHORT ABSTRACT

Precise determination of soil water infiltration and sub-surface water movement is essential for developing soil-water management practices. For modeling flow and transport in the sub-surface zone and unsaturated porous media, the knowledge of the wetting hydraulic properties, including, water retention characteristics curve (WRCC) and soil hydraulic conductivity functions (SHCF), are critical. This study evaluated the potential of mini disc infiltrometer (MDI) measurements for characterizing wetting soil hydraulic properties using both laboratory and field measurements and various soil textures. It analyzed the influence of tension head and initial soil conditions on estimated parameters from MDI measurements, evaluated time dependence on transient analysis from MDI, and compared MDI measurements with other established devices. In addition, with the help of independent measurements and inverse modelling, it demonstrated the utility of MDI for rapidly and effectively characterizing the WRCCs and SHCFs from laboratory measurements. This study demonstrated that MDI is a useful, non-intrusive, and non-invasive tool for characterizing soil hydraulic properties, with important implications for improving our understanding of infiltration at the soil surface and redistribution, and further movement of soil water in the vadose zone.