

Infiltration into Inclined Fibrous Sheets

I. Eames⁽¹⁾, M. Landeryou⁽²⁾, A. Cottenden⁽²⁾

(1) *Departments of Mechanical Engineering & Mathematics, University College London, UK*

(2) *Department of Medical Physics, University College London, UK*

Most medical absorbents, e.g. sanitary towels, incontinence pads and wound dressings, consist of fibrous sheets. We describe a detailed theoretical and experimental study of the capillary driven and source driven flows, through an inclined fibrous sheet. Fluid transport is modeled using Richards' equation which employs experimentally determined closure relations between pressure, moisture and permeability. Similarity and numerical solutions for the rate of spreading of wetted regions and the moisture profiles are developed and agree with experimental measurements. The spread fluid from a point source on an inclined sheet may be described, for short time, by a similarity solution, with the down and cross slope width spreading in a diffusive manner. But for large time, we must appeal to numerical solution and an approximate model, which shows a pronounced asymmetry with down and cross-slope spreading. Extensions of the analysis and experiments to inhomogeneous layered and rewetting are described.

[View the extended summary](#)