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Micro-PIV Evaluation of Lateral Flow Assays EMILIE NEWSHAM, STEVE WERELEY, JACQUELINE LINNES, Purdue University — Lateral flow assays (LFAs) are an increasingly common technology (e.g. pregnancy tests) but are limited in scope and sensitivity due to minimal understanding of their underlying fluidic properties. LFAs comprise porous paper membranes that transport liquid samples along a test strip through capillary action to dried reagents, where binding reactions produce a readable signal. Mathematical models informed by analytical evaluations have been created to optimize LFA development, but none use empirical microfluidic data to derive model parameters. Here, micro-PIV is used to evaluate liquid flow in LFAs. Videos of liquids carrying nanoparticles flowing through LFA membranes under different conditions are analyzed using micro-PIV. The porous membrane has different permeability to the liquid and nanoparticles which means the observed particle motion is not the same as the fluid motion. A scale factor between the visible macroscopic fluid front and microscopic particle velocity is derived. This novel microscopic evaluation method will inform intelligent models for more efficient development of LFAs.

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