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Filtration of a fiber suspension: velocity measurements and Fokker-Planck orientatation simulations GABRIELE BELLANI, FREDRIK LUNDELL, KTH Mechanics, L. DANIEL SÖDERBERG, STFI packforsk — We present an experimental and numerical study on the filtration of a dilute suspension of flexible fibers. The experiments were performed in a vertical channel, and sedimentation occurred in the direction of the filtration flow. The channel had a square cross section. The suspension was made optically transparent by matching the index of refraction of fluid (mixture of glycerine) and fibers (fluorocarbon, d=260 μm, l=9.8, 18.6 mm), and Particle Image Velocimetry was used to measure the time-resolved velocity field of the fluid phase in the proximity of a permeable screen, where the fibers were retained. The velocity was measured in a vertical plane located in a region where wall-effects are negligible. The evolution of the orientation distribution of the fibers in this plane was calculated with the Fokker-Planck equation, based on the measured flow fields. This was done under the assumption of creeping flow. Both filtration velocity and fiber aspect ratio have a considerable effect on the final orientation distribution of the network formed on the wire. Our methodology allows us to distinguish between these two factors.

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