

**Title:** Filling and wetting transitions of nematic liquid crystals on sinusoidal substrates

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**Abstract:** Close to sinusoidal substrates, simple fluids may undergo a filling transition, in which the fluid passes from a dry to a filled state, where the interface remains unbent but bound to the substrate. Increasing the surface field, the interface unbinds and a wetting transition occurs. We show that this double-transition sequence may be strongly modified in the case of ordered fluids, such as nematic liquid crystals. Depending on the preferred orientation of the nematic molecules at the structured substrate and at the isotropic-nematic interface, the filling transition may not exist, and the fluid passes directly from a dry to a complete-wet state, with the interface far from the substrate. More interestingly, in other situations, the complete wetting transition may be prevented, and the fluid passes from a dry to a filled state, and remains in this configuration, with the interface always attached to the substrate, even for very large surface fields. Both transitions are observed only for a same substrate in a narrow range of amplitudes.

**KeyWords Plus:** Phase-Transition; Surfaces; Adsorption; Films; Water; Layer

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