Abstract Submitted
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Effect of contact line dynamics on capillary wave scattering by an infinitesimal barrier[1] LIKUN ZHANG, DAVID THIESSEN, Washington State University — Novel fluid configurations are possible at zero Bond number when capillary instabilities are countered by minimal solid support structures such as thin wires. Large aspect ratio liquid cylinders can be stabilized by an array of solid rings or by a helix. Capillary wave propagation on such channels involves scattering by a periodic array of barriers. The transmission and reflection of capillary waves by a single infinitesimal transverse barrier is considered theoretically by a matched evanescent wave expansion. An effective-slip boundary condition is applied for which the contact-line velocity is proportional to the deviation of the contact angle from its equilibrium value. Energy dissipation at the barrier is found to be most effective when the phase velocity is close to the phenomenological slip coefficient. The scattering of capillary waves on a liquid cylinder by a transverse ring agrees in the short-wave limit with the theory of gravity- capillary wave scattering by a transverse surface-piercing barrier in the limit of zero Bond number and zero barrier depth.

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