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**Remote recoil between waves and vortices in superfluids** YUAN GUO, OLIVER BUHLER, Courant Institute of Mathematical Sciences, New York University — This is a theoretical and numerical study of a particular wave-vortex interaction effect in superfluids, which extends previous work in classical compressible fluid mechanics. The fundamental modeling assumption is that both waves and vortices can be described by the defocusing nonlinear Schrödinger equation. At play is the refraction of small-scale waves by inhomogeneous straining flows due to one or several line vortices and the concomitant back-reaction, the"remote recoil", that is felt at the vortex locations. The remoteness is meant to highlight that the waves and the vortices are far from each other, and do not overlap in physical space. This recoil is of second order in wave amplitude and can be computed from the pseudomomentum budget of the waves. The recoil force and the scattering angle are computed both for finite and infinite wavetrains and the results are cross-checked against numerical integration of the relevant ray-tracing equations. We also consider the peculiar case of a wavetrain collapsing onto a single vortex, in which the wave-vortex interactions are not remote anymore. For some parameter values the WKB theory underlying ray tracing may retain its validity during the wave collapse. This would be a novel form of singular absorption of waves by a vortex.

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