Hall Viscosity I: Linear Response Theory for Viscosity BARRY
BRADLYN, MOSHE GOLDSTEIN, NICHOLAS READ, Yale University — In two
dimensional systems with broken time-reversal symmetry, there can exist a non-
dissipative viscosity coefficient [1,2,3]. This Hall viscosity is similar in nature to the
non-dissipative Hall conductivity. In order to investigate this phenomenon further,
we develop a linear response formalism for viscosity. We derive a Kubo formula for
the frequency dependent viscosity tensor in the long wavelength limit. We compute
the viscosity tensor for the free electron gas, integer quantum Hall systems, and
two-dimensional paired superfluids. In the zero frequency limit, we show how the
known results [3,4] for the Hall viscosity are recovered.

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Barry Bradlyn
Yale University

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