Two-fluid hydrodynamic modes in a trapped Fermi superfluid gas[1] EDWARD TAYLOR, ALLAN GRIFFIN, University of Toronto — In the collisional region at finite temperatures, the collective modes of superfluids are described by the Landau two-fluid hydrodynamic equations. This region can now be probed over the entire BCS-BEC crossover in trapped Fermi superfluids with a Feshbach resonance . We have recently developed a variational formulation of the two-fluid hydrodynamic equations that greatly simplifies calculations of the collective modes in trapped superfluid gases. The frequencies are given in terms of effective spring constants involving spatial integrals over position-dependent equilibrium thermodynamic functions. We present results based on this theory using the LDA and thermodyanmic functions for a uniform gas in the BCS-BEC crossover region, with pair fluctuations included using the Nozières and Schmitt-Rink approximation. The temperature dependent out-of-phase hydrodynamic modes (the analogue of second sound) are of particular interest.

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Date submitted: 30 Nov 2005   Electronic form version 1.4