Unstable modes of a sheared pycnocline above a stratified layer
SCOTT WUNSCH, KURT KELLER, Johns Hopkins University — Internal waves incident on a sheared ocean pycnocline are studied using analytic and numerical methods. Linear analysis of the unstable modes of a sheared ocean pycnocline is used to demonstrate interactions between internal waves and shear instabilities. A new analytic solution for an asymmetric shear layer over a stratified layer is presented, illustrating modes which couple to internal waves, in addition to the well-known Holmboe modes. The robustness of these solutions is demonstrated using numerical methods for realistic shear profiles. Fully nonlinear numerical simulations illustrate the growth of these modes and demonstrate the excitation of shear instabilities by incident internal waves. The results may have implications for internal wave interactions with the ocean pycnocline and the local generation of internal solitary waves.