Harmonic generation by internal waves in a thermohaline staircase with rotation SCOTT WUNSCH, The Johns Hopkins University — Thermohaline staircases, generated by double-diffusive convection, are found in many regions of the ocean. Oceanic internal waves interact with these staircases. Recent results (Sutherland PRF 2016; Ghaemsaidi et al. JFM 2016) show that, in linear theory, internal waves with sufficiently long wavelengths are transmitted through the staircase, while short wavelengths may be reflected. However, nonlinear self-interaction of internal waves (Diamessis et al. Dyn. Atm. Oceans 2014; Wunsch JFM 2017) with the sharp density jumps within the staircase is expected to generate double-wavenumber harmonics of the incident waves. This effect removes energy from the incident waves, reducing the transmitted energy in some cases. Energy transferred to the harmonic waves may also impact the stability of the staircase. Here, weakly nonlinear theory is used to explore the implications of this nonlinear effect on the dynamics of internal waves in oceanic thermohaline staircases. Rotation is included, and variations with latitude are considered.

Scott Wunsch
The Johns Hopkins University