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Wind-forced evolution of long internal waves in a large lake TAKAHIRO SAKAI, LARRY REDEKOPP, University of Southern California — A wind forced, weakly nonlinear, weakly dispersive evolution model is derived for a continuously stratified, circular lake of slowly varying depth under the effect of earth rotation. The model was numerically integrated to investigate the evolution of long internal waves of vertical mode one for various sets of environmental parameters. It is demonstrated that Kelvin waves steepen as they propagates, and the steepened front subsequently generates a train of oscillatory waves. It is demonstrated that Poincare waves do not steepen, but their amplitudes are modulated in time, exhibiting a pseudo recurrence character. The model was applied to the wind forced problem, confirming that Kelvin and Poincare waves are the dominant response. The energy partition between Kelvin and Poincare wave modes is estimated. For large lakes, the dominant wave amplitude is found in the Kelvin wave mode, but the Poincare wave mode clearly dominates the total energy deposited by an applied wind stress.

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