Abstract View

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Migrating Thermal Structure in a Freshwater Thermocline

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ABSTRACT

The vertical migration of thermal structure in freshwater thermoclines is investigated with theory and observations. The theory is for the wind-forced internal oscillations of a viscous, nonrotating, long narrow lake of constant stratification. The introduction of viscosity results in a smooth phase change with depth near the nodes of the vertical displacement profiles, The gradual change of phase enables the theory to model the observed vertical migration of the temperature structure created by the internal oscillations. The theory is compared to data obtained from a vertical army of thermistors moored in a stratified freshwater lake. Vertical phase profiles calculated from the thermistor chain data agree well with the theoretical profiles for values of kinematic viscosity of about 10.0×10^{-6} $m^2 s^{-1}$. The amplitudes of the vertical displacement away from the nodes agree reasonably well with values predicted by the theory. The agreement is sufficient to warrant the description of the migrating structures in terms of damped internal oscillations of the lake.

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