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Internal Solitary Waves with shear: beyond DJL theory

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While background shear is ubiquitous in the natural environment, the vast majority of theoretical and numerical studies of internal solitary waves do not include a background shear. Walter et al 2016, Continental Shelf Research reported on measurements in Monterey Bay in which large amplitude internal solitary wave trains were observed but corresponding waves could not be computed from DJL theory due to the strength of the background shear. In this talk I will revisit this issue using a classical stratified adjustment set up. For the case of an exponential, surface trapped background current I will demonstrate that internal solitary wave trains with and without trapped cores coexist with a substantial region dominated by stratified shear instability and/or Rayleigh Taylor instability. I will then demonstrate the type of internal wave train that results in cases when the the variational formulation of the DJL equation fails to converge. I will speculate on implications for theoretical description of such waves and for more realistic simulations in the coastal ocean.

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