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Drift in sheared shallow water waves[1] WILLIAM R.C. PHILLIPS, Swinburne University of Technology, ALBERT DAI, KUAN TJAN, University of Illinois at Urbana Champaign — The drift in an $O(\epsilon)$ monochromatic wave field on a shear flow whose characteristic velocity is $O(\epsilon)$ smaller than the phase velocity of the waves is considered. It is found that shear plays an increasingly important role as the depth decreases. Details of the shear flow likewise affect the drift. Two temporal cases common in coastal waters are studied: wind driven shear and current driven shear. In the former, the magnitude of the drift (maximum minus minimum) in shallow water waves is increased significantly above the Stokes drift. In the latter, on the other hand, the magnitude decreases. However, while the drift at the free surface is oriented always in the direction of wave propagation in stress driven shear, that is not always the case in current driven shear, especially in long waves as the boundary layer grows to fill the layer. This later finding is of particular interest vis a vis Langmuir circulation, which arise through an instability that requires differential drift and shear of the same sign. This means that while Langmuir circulation form near the surface and grow downwards (top down), perhaps to fill the layer, in stress driven shear, their counterparts in current driven flows grow from the sea floor upwards (bottom up) but can never fill the layer.

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