



FIGURE 7.5. Waves and associated water currents in shoaling water. Waves change from long, low, symmetrical, and sinusoidal to short, high, asymmetrical, and trochoidal as the depth decreases. Arrows indicate the maximum orbital velocity under a wave trough or crest. Just above wave base, the maximum near-bed orbital velocity is small and of the same magnitude in either direction (Stokes drift is minimal). As waves change with decreasing depth, the near-bed orbital velocity increases, and the onshore velocity under the wave crest increases relative to the offshore velocity under the trough (due to Stokes drift). Near the water surface, the water velocity under wave crests and troughs increases onshore as waves increase in height. Differences between onshore- and offshore-directed flow velocities are due to Stokes drift. Arrows in the surf zone indicate swash and backwash.