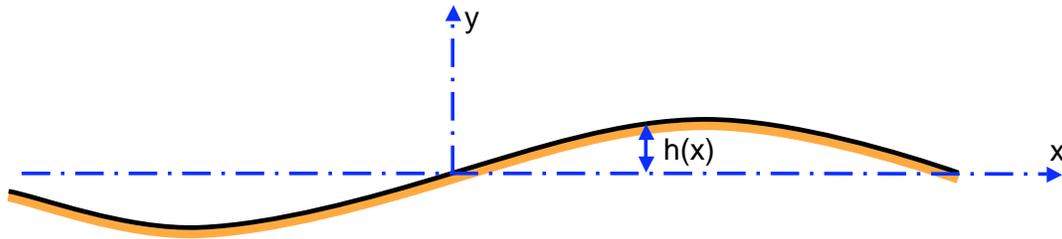


Problem 344A

Find the velocity potential for the subsonic, planar, irrotational and inviscid flow of a compressible fluid over a wavy wall whose surface is defined by $y = h(x) = a \sin kx$:



The wall is almost flat; that is to say the amplitude of the waves, a , is much smaller than the wavelength, $2\pi/k$. The fluid extends to $y \rightarrow \infty$ where the velocity of the uniform stream is $u \rightarrow U$ ($v = 0$) where the velocity components in the x and y directions are denoted by u and v . The velocity potential involves the Mach number, M , defined as U/c where c is the speed of sound.