Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Use of Potentials for Acoustic Diffraction in a Viscous Fluid ANTHONY DAVIS, University of Alabama — In inviscid acoustics, the dilatation and pressure satisfy a Helmholtz equation in the frequency domain. Viscosity generates vorticity which satisfies a Helmholtz equation that yields viscous decay on a scale assumed much smaller than the acoustic wavelength. Guided by the similar solution structure for an elastic wave displacement vector, it is common practice to write the velocity as a sum of gradient and curl fields and assume that each has only wavelike disturbances. However, when a sharp edge is present and a similarity solution in its vicinity is sought, it is found that previously rejected solutions of Laplace's equation are needed to achieve the known biharmonic behavior near the edge. Occurring as conjugate harmonic functions, they do not contribute to the total velocity field. Illustrative examples have a damped acoustic plane wave incident on a solid, or possibly elastic, sphere or on a half-plane.

Anthony Davis
University of Alabama

Date submitted: 02 Aug 2005

Electronic form version 1.4