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Subject: Pipes, tapered pipes and Helmholtz resonators

Posted by [Wayne Parham](#) on Thu, 22 Sep 2005 17:55:43 GMT

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We've had some discussions here about bass-reflex, tuned pipes, tapered pipes and horns, specifically about their similarities and differences. So I've taken a moment to put together a list of references from authors other than those that normally contribute here.

Acoustics and Vibration Animations, list of articles and demonstration by Dr. Daniel Russell

Acoustic High-Pass, Low-Pass, and Band-Stop Filters, Daniel Russell discusses propagation of sound through ducts, transmission lines and acoustic filter chambers

Superposition of Waves, shows the interaction of standing waves

Radiation from a Baffled Piston, shows the effects of frequency on directivity

Evanescent Modes in Waveguides, shows higher order modes in ducts driven above and below their cutoff frequency

Mass-Spring Systems with Damping, shows how system damping affects resonance amplitude, which in turn affects response

The Forced Harmonic Oscillator, shows systems driven below resonance, at resonance and above resonance

Coupled Oscillators, shows two mass-spring systems, like the mechanical resonance of a loudspeaker and the acoustic resonance of the cabinet

The Dynamic Vibration Absorber, shows how two tunes systems can be optimized for working together. Think speaker and box.

Vibrational Modes of a Circular Membrane, shows cone flex breakup modes

HyperPhysics - Resonance, several links on the subject

HyperPhysics - Air Column Resonance, online calculator of open pipe, closed pipe and tapered pipe resonant modes

HyperPhysics - Cavity Resonant Frequency, online calculator of Helmholtz resonant frequency

Resonance, standing waves, & Eigentones, discussion of resonance and Q

Air Column Acoustics, a description of wave propagation in pipes and conical sections

Musical Acoustics - Some Introductory Pages, several links about matters acoustic from the University of New South Wales

Pipes and Harmonics, University of New South Wales, compares closed cylinder pipes, open cylinder pipes and closed conical pipes

Helmholtz Resonance, University of New South Wales, describes Helmholtz resonance

Sound Waves and Music, several online lessons from the Physics Classroom

Resonance and Standing Waves, Physics Classroom

Standing Waves and Resonance, describes standing waves in mechanical, electrical and acoustic transmission lines

Resonata, a groovy applet

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