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Subject: Re: Constant directivity tweeter horns and waveguides

Posted by [Martin](#) on Thu, 03 Apr 2008 18:57:57 GMT

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Wayne, You are way ahead of me when it comes to understanding and designing horns. But I am working on a couple of horn related modeling efforts. I'll list them below in no particular order. 1) I want to change my 1D modeling tool to get away from flat plane wave assumptions. I intend to model the waves in the horn curved such that they are normal to the side walls. This will mean more reflections when the geometry changes. I am not sure how significant this will be. 2) Modeling what goes on at the mouth is always interesting. If you follow a textbook derivation that is based on Webster's equation, then the mouth acoustic impedance is assumed to be modeled as a piston in an infinite baffle. In other words the volume velocity and pressure are constant everywhere on the surface that is defined as the mouth. In the past week or so I have calculated the pressure profile, assuming a constant velocity, on the surface of the mouth. So I now have a position dependent acoustic impedance of the mouth. I think this will eventually lead me to velocities at the mouth in multiple directions, axial and across the horn's mouth (out of plane motions). 3) As part of 2), I have also started to include the edge diffraction effects of a baffle or just the edge of the mouth itself when calculating the mouth's acoustic impedance. I got this working last night and will continue to explore this over the weekend. I can also see this becoming more sophisticated as I look at a diffraction due to a discontinuity as the mouth transitions into the room and the wave shape "distorts" from a smooth curved profile. (Man, that sounds like a snake oil salesman's techno-babble.) 4) I also want to add some plots to my documentation to show the sound waves in the mouth as a function of frequency, above and below the cut-off frequencies for a few different horn profiles solved with Webster's equation modeling. 5) I think numerical solutions are the key, I am not smart enough to do a closed form solution. I will probably start with brute force approaches that calculate forever and then start to simplify and take shortcuts. 6) I also think there will be a lot of value in experimenting and measuring some of the compression driver horns. So I am putting together a list of compression drivers and horn profiles I want to buy, model, and test (w/ Praxis) to help calibrate myself. I will also be very interested to substitute these into my home system to assess the pro's and con's of them compared to my direct radiator drivers. I guess I am keeping busy and horns have the bulk of my attention right now, but I have said that before and it has been short lived. Keeping busy, Martin

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