Subject: manipulation of horn calculation
Posted by DanTheMan on Tue, 19 Apr 2005 01:08:10 GMT
View Forum Message <> Reply to Message

In a recent issue of Audio Xpress the exponential horn equation is given as: Area at(X)=Thrat Area x e^4piX/lamda in free space. How would you change it for half-space, quarter-space, and eighth-space? Also, how does the math seem to correlate to real world conditions? Thanks a lot in advance!

Subject: Re: manipulation of horn calculation
Posted by Wayne Parham on Tue, 19 Apr 2005 19:32:30 GMT
View Forum Message <> Reply to Message

Placing a horn near a boundary acts similarly to a mirror, so for example, half-space acts like twice the cross-section area of a horn in freespace. Once you get to eighth-space, you also gain length because the expansion from the apex of a corner forms a conical horn, all by itself. The corner's expansion adds length and area because it is quite literally a horn flare in toto. Grab a copy of McBean's Hornresp program and run some horn simulations because that will give you a good feel for the behavior of different horn flares in different spatial conditions.

Subject: Re: manipulation of horn calculation
Posted by DanTheMan on Tue, 19 Apr 2005 22:15:28 GMT
View Forum Message <> Reply to Message

Thanks, that's a really interesting way of looking at things. You cleared up my foggy understanding about how boundaries work. Can you simply divide the area in half then to simulate half-space? Would quarter space then mean you could half the length and eighth space mean you can quarter the length? For some reason I just want to be able to do this with decent accuracy without having to use a computer program--I'm still gonna download it though. I can probably compare a table of my results using the Audio Xpress equation to the simulated McBean horn and find my missing constants. It makes me nervous though--a year ago I downloaded an open baffle program that didn't come close to simulating the response I got. I hate to ask for hand-outs, but I've researched my College Algebra and Calc textbooks and I just can't find anything to point me in the right direction. One of you guys should write a "Gormet Cookbook," I hate Mickey-Ds. That would save you from my stupid questions and put more money in your pockets--probably the only useful advice I can give with absolute confidence. Thanks again Mr. Parham and anyone else able to help.

Subject: Re: manipulation of horn calculation
Posted by Dean Kukral on Tue, 19 Apr 2005 22:58:08 GMT
View Forum Message <> Reply to Message

This equation is for the cross-sectional area, A(X), of the horn as a function of length from the throat, X, to the cross-section and of lambda, which determines the expansion rate, i.e. whether the horn is long and thin or short and fat. One does not "change it" for half-space, etc. If you had a lathe, you could carve out the horn based on this equation.Then, when you put your final, built horn into the world, you have to examine the effects of the world. That is where half-space, etc come into play. Now, the equation is no longer relevant.I hope this makes sense.I am not sure how programs such as Hornresp work, but, I suspect that they use an approximation method known as "finite elements." These approximate a solution of the wave equation, given simplifying assumptions and initial values. The initial values come from the assumed shape of the wavefront eminating from the horn and the presence of boundaries (walls, etc). This can be done relatively accurately in a controlled environment given sufficient computer power and financial resources.

Subject: Re: more to it
Posted by GraemeG on Wed, 20 Apr 2005 00:52:42 GMT
View Forum Message <> Reply to Message

The formula you have quoted will let you know physical sizes for a given throat and expansion, but will not tell you the optimum parameters for a given driver. Whilst it is true that length will be less for quarter and eighth space loading, it will not be half or quarter length. You have to be mindful that if the horn length is less than a quarter wavelength at any frequency, it will not act as a horn at that frequency. Horn design is all about compromises, and the math involved in arriving at the compromise to suit your own goals is considerably more complex than what you have.As Wayne suggested, try Hornresp - it is quite accurate down low, and will allow you to find the best compromise between throat area, flare rate, mouth area, horn length, rear chamber volume etc, and THEN you can use the AudioXpress formula to calculate the physical horn sizes (assuming that an exponential expansion is required - there are other taper rates which may suit your goals better).CheersGraeme

Subject: Re: manipulation of horn calculation
Posted by Wayne Parham on Wed, 20 Apr 2005 02:03:28 GMT
View Forum Message <> Reply to Message

That's basically it, but it's cross-section area that boundaries reflect, not length. You can visualize it as reflector being along the long axis of the horn rather than perpendicular at its axis. Eighth-space and greater is an exception because the spacial relationship defined becomes a horn in and of itself.

Subject: Re: more to it
Posted by DanTheMan on Wed, 20 Apr 2005 23:41:17 GMT
View Forum Message <> Reply to Message

WOW! Thank you all very much! You've given me alot to think about. My understanding is much more clear now. Unfortunately my hopes of designing my own horn system (top to bottom end) are all but squashed. Buying a DIY kit seems much more reasonable from a financial/emotional standpoint(eliminates the failure headache and associated relentless tweaking). In two months I'll have a good job (graduation pending), then I'll look even more deeply into it. Thanks again!

Subject: Re: more to it
Posted by Mike.e on Thu, 21 Apr 2005 03:10:48 GMT
View Forum Message <> Reply to Message

http://www.volvotreter.de/ -> Downloads ->dinsdale horn files,edgar horn files!Free Must haves!!
Link