Subject: Why phase reversal Hornresp
Posted by Coolin on Fri, 09 Dec 2005 18:50:05 GMT
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I'm no expert on this but can anyone tell me why the phasing in Hornresp is in reverse compared to other programs?The highs are 180degrees delayed coming back to 0 degrees around horn cut off continuing to phase lead at the lowest frequencies....Im talking about a front horn here. Regards,Coolin

Subject: Re: Why phase reversal Hornresp
Posted by Wayne Parham on Fri, 09 Dec 2005 19:41:47 GMT
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A horn acts like a band-pass filter, having both low-pass and high-pass features. That's why phase shifts with respect to frequency, because it is passing through each of these types of filters. At low-frequencies, the system appears electrically capacitive, like a high-pass filter. At high-frequencies it appears electrically inductive, like a low pass filter. There are several other resonance modes in the passband due to reflections of standing waves, and those appear as blips in the impedance curve, also reflected as blips in both amplitude and phase response.

Subject: Re: Why phase reversal Hornresp
Posted by Coolin on Fri, 09 Dec 2005 21:04:17 GMT
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Ok so higher frequencies are delayed but its impossible to have a phase lead for the bass ! ..Thinking about it this might be based on the electrical "rule" -90 degree phase shift for a capasitor and +90 for an inductor. this is purely electrically though. Somehow Hornresp streches this to -+180 degrees...Half of a bass cycle is a VERY long time. How in the **** can it be shifted this long purely acousticly ???My method of learning is through understanding.. Its not working right now It would be much more understandable if mr Mcbean would add groupdelay instead of phase. I have also seen some speaker measurement graphs that also speak of phase but omit the amount of full cycles and round off to the nearest cycle.Thanks for any mental help ...

Subject: Re: Why phase reversal Hornresp
Posted by Wayne Parham on Mon, 12 Dec 2005 15:02:06 GMT
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Phase is relative, and the reference is a purely resistive impedance. Reactive impedances either lead or follow that in motion as a force is applied. Think about a swing. You can push exactly at the moment that the most force will be transferred, which is just after the time when the swing comes nearest to you. You are pushing as the swing goes away. You can push way too soon, in which case you are really pushing against the swing, slowing it down. You can push way too late, in which case you aren't doing any good. You can even push so late that you are slowing the swing, providing a force counter to the swing's motion. Each of these times can be described as phase, a number of degrees before the swing reaches you or after. A full cycle is 360°, and a half cycle is 180°. When the swing reaches it's lowest point, you can say it is 90° after the point it's nearest you or 90° ahead of the point where it's furthest from you. It's all just ways of describing relative positions.

Subject: Re: Why phase reversal Hornresp
Posted by CO on Tue, 13 Dec 2005 07:17:35 GMT
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I understand the concept. Its just that the idea only considers a train of waves and not the initial(first)wave which ofcourse is impossible to lead.This suggest to me that what is being called leading is in fact so delayed that its just ahead of the next cycle and therefore called leading.....

Subject: You are absolutely correct
Posted by Earl Geddes on Mon, 19 Dec 2005 13:32:15 GMT
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It is impossible to have a phase lead at LF - it must go to zero as the frequency goes to zero or something is wrong. In this case the horn equations - Websters - are wrong and predict some things athat are ficticiuos - like "cutoff" - doesn't happen in reality. I can't say for sure that this is the problem, but I can say for sure that anything derived from Webster's equation is wrong.Problem is that Websters EQ should become more accurate at very LF, but if the calculations below "cuoff" are not done properly you could get the result that you see.

Subject: Re: You are absolutely correct
Posted by CO on Tue, 20 Dec 2005 07:04:48 GMT
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Hello Earl Geddes,Thanks for the reassurance of my thinking. Also i presume your speaking of the upper cuttoff thats wrong? I have noticed that it indeed falls very soon.Or do you meen lower cutoff? Do you have a rule of thumb to predict the true response of upper and lower cuttoff for

hornresp?Regards,Collin

Subject: Cutoff
Posted by Earl Geddes on Tue, 20 Dec 2005 13:06:47 GMT
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If one derives the transfer characteristics for an exponential horn with Websters Equation then it predicts that below a certain frequency - based on flare rate - there is no transmission of sound, i.e. its "cutoff frequency". But experience, and logic, tells us that this is not the case. Again, in theory, Websters EQ does not predict a high frequency limit, although we all know that one exists.There is a lot to waveguide design, more than simply predicting (inacurately) its axial response.

Subject: Re: Cutoff
Posted by CO on Tue, 20 Dec 2005 14:24:46 GMT
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And what is in your opinion the most accurate method ?hopefully there is software that uses this as i'm not very good in math...Regards,Collin

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Subject: Waveguide Theory, of course
Posted by Earl Geddes on Tue, 20 Dec 2005 15:12:56 GMT
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In 1991, I gave an AES paper on a new approach to "horn theory" that was dramtically different - hence the new name "Waveguide Theory". The main aim of waveguide theory was to predict directional response and not loading - loading being the only factor of a horn that Websters approach can predict. Loading is important to some who are limited to very low power amplifiers, but I think that my views on that aspect of the problem are well known.Waveguides are for directional control - they do provide loading, of course, but waveguide theory is the only way to design devices for directional control. If you want to see the kind of difference that this can amke then read the next chapter of my book when its posted in about a week or so, or I will be posting some new measurements of my Summas which show the clear advantage of Waveguides.Waveguide theory is far more accurate than Horn theory, but the price that we must pay is difficulty. Waveguide theory is far more mathematically intense than Horn theory, which is pretty simple. However, experience has shown that waveguides outperform horns in ever way - except simplicity of design.SPEAK is the only program that I know of that even approachs the complexity of waveguide theory, and even it is simplified. I am rewritting SPEAK now to improve

on the waveguide calculations among other things, but this is not a high priority since I make no money on SPEAK.The best discussion is in my book Audio Transducers - Chapter 6, but I now realize that even this chapter is simplified. After three years I've gotten enough feedback to realize how I overlooked a lot of things.Thus, there are only a handful of people who have succesfully designed and built waveguides to my theory. The best designer that I know of is, not surprisingly, myself. I actually know a lot of proprietary things about practical designs that I have not disclosed.Sorry that I can't make things simply for you, but brain surgery is not that easy to do and I don't recommend you try it on your kids.

Subject: Re: Why phase reversal Hornresp
Posted by David McBean on Sat, 24 Dec 2005 05:02:04 GMT
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Coolin,Hornresp phase response results are entirely consistent with those published by Marshall Leach in "Introduction to Electroacoustics and Audio Amplifier Design".Hornresp Version 8.30 to be released on New Year's Day will generate both phase response and group delay charts.David McBean

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Subject: Re: Waveguide Theory, of course
Posted by majestik6 on Fri, 30 Dec 2005 00:45:13 GMT
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Dr Geddes,While I agree that the math is alarmingly complicated, building a waveguide isn't particularly complex. Just calculate the curve in Excel, plot the pieces with any drawing program, and you're ready to start building them up. I prefer to build them out of fiberglass composites, but building them out of wood isn't out of the question either.PB

Subject: Re: Waveguide Theory, of course
Posted by Earl Geddes on Fri, 30 Dec 2005 03:11:06 GMT
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As any good consultant will tell you, its the details that matter. There are a great many "details" that I have learned along the way that make a big difference. Like, for instance, the exit angle for a compression driver is never 0°.Anyway, good luck to you, but please remember that things may not always be as easy as they seem.
