Subject: Alpha 10 modeling
Posted by solomty on Fri, 17 Apr 2009 21:09:16 GMT
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Hy Wayne. Just model Alpha 10 with WinISD and the resulting graph is a very impressive. 29.4Hz @ - 3db in a 10 cf box a very big box for sure. Could tell me how compare your two Pi tower with 4.7cf against the 10cf box? Thanks

Subject: Re: Alpha 10 modeling
Posted by Wayne Parham on Fri, 17 Apr 2009 21:37:53 GMT
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full 100 watts throughout the passband.

You could use the Alpha 10 in a larger box with an EBS alignment to get deeper extension. But excursion will limit your bass output in a large box, so be sure to limit the power below 100Hz. Excursion will become excessive in a 10ft3 cabinet at about half the power of a 5ft3 box.

Subject: Re: Alpha 10 modeling
Posted by rvsixer on Tue, 20 Dec 2011 15:48:24 GMT
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Sorry for bringing back an old thread (and hope the OP does not mind). This just seemed a relevant place for my question without starting a new one.

I'm a winisd/modeling newbie, for the 2pi towers I am seeing xmax at only 2.2W input, while its posted here we can send 100W through the passband . What am I doing wrong?

Inputs:
Alignment: tried all of them (what is the correct one, EBS?)
Volume: 129 liters
Port dia: 11.43 cm
Port length: 1.59 cm

Subject: Re: Alpha 10 modeling
Posted by Wayne Parham on Tue, 20 Dec 2011 19:51:47 GMT
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Make sure you are band-limiting when you check the numbers. If you look at the mechanical limits below 30Hz or so, they're very small because the cone is unloaded below the Helmholtz frequency. Also check the easy (but easy to miss) stuff like metric verses imperial and make sure you aren't off by a decimal point.

What you should see is thermal limits exceeding mechanical limits except below the Helmholtz frequency. There's a range just above Helmholtz where the mechanical limits dip, but they never dip below 100 watts anywhere in the passband (above 35Hz). Below the passband, the limit is mechanical and can be reached with little input because the cone is unloaded. From 35Hz to 50Hz, excursion is greatly reduced and so the limit is thermal. In between about 50Hz and 60Hz, the two limits (mechanical and thermal) are very close to the same. Above 70Hz the limit is thermal.

Subject: Re: Alpha 10 modeling
Posted by rvsixer on Tue, 20 Dec 2011 22:17:41 GMT
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Thanks for the thermal/mechanical explanation. My winisd modeling follows the expected responses you outlined, except that xmax appears to be exceeded. Or is xlim the value we are trying to stay under?

Not doubting, just trying to learn modeling vs. real world. I've checked and rechecked the input numbers and just can't get it straight. Even more confusing is I have modeled several other woofer/subwoofer designs, and all of them were pretty much spot on modeled vs. real world (using xmax as the mechanical limit, I assume to avoid high distortion values).

Please take a look at the attachments, maybe you can see where I am going wrong. Thanks!

File Attachments
1) 2pi_tower_spl.jpg, downloaded 3964 times
2) 2pi_tower_port.jpg, downloaded 3850 times
3) 2pi_tower_4w_xmax.jpg, downloaded 3956 times
4) 2pi_tower_100w_xmax.jpg, downloaded 3969 times

Subject: Re: Alpha 10 modeling
Posted by Wayne Parham on Tue, 20 Dec 2011 23:00:53 GMT
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It looks like your red line is around 1.25mm, yes? But xmax of the Alpha 10 is 3.2mm and xlim is 9.1mm.

You can check this with distortion measurements, if you like. It stays low in the passband, and rises below it. All through the passband, distortion stays low at power levels under 100 watts. As power is increased to 100 watts and above, distortion rises around ~60Hz, as excursion begins to become excessive in that region. So the models track well with measurements.

One other thing: The Helmholtz frequency is 40Hz, not 50Hz. If you make this change in your computer model, it will be more representative of the behavior of the physical device. Your response curve will change from being slightly underdamped (humped, as shown in your simulation) to slightly overdamped, (flat, no hump) and a bit gentler rolloff than max-flat. Just an FYI.

Subject: Re: Alpha 10 modeling
Posted by rvsixer on Wed, 21 Dec 2011 00:03:08 GMT
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The graph is in imperial units, xmax = 0.126in ~ 3.2mm.

I have played with the default tuning winisd calculates after providing box size/port dia/port length to 40Hz. This change shows 8.86mm cone excursion @ 60Hz (still way over xmax).

I am going to give unibox a whirl and see what happens.

Subject: Re: Alpha 10 modeling
Posted by Wayne Parham on Wed, 21 Dec 2011 00:09:28 GMT
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Now that you've changed fb (the Helmholtz frequency), I think you probably have a pretty good model, although I think you're interpreting the charts overly cautiously. I'm tempering my interpretation of the simulations with what I know from the distortion measurements. Excursion does go over xmax around 60Hz (but nowhere near xlim), and distortion at that point is just breaking double digits. It doesn't get anywhere close to damaging the driver at 100 watts, and while distortion is higher between 50-60Hz, it doesn't become severe at those power levels.

Subject: Re: Alpha 10 modeling

Posted by rvsixer on Wed, 21 Dec 2011 02:14:40 GMT
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That's good to know on the distortion.

WinISD was installed in imperial mode (note all other graphs are in imperial units). Unibox shows the same cone excursions (very near xlim @ 60Hz).

File Attachments
1) VB Excursion Eminence Alpha-10a.gif, downloaded 3624 times

Subject: Re: Alpha 10 modeling
Posted by Wayne Parham on Wed, 21 Dec 2011 02:28:48 GMT
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Like I said, I think your model is probably pretty good at this point. While I wouldn't generally suggest designing a speaker to operate near xlim full time, I would say that exceeding xmax in this speaker isn't terribly objectionable. This speaker doesn't sound bad when the ~60Hz region is between xmax and xlim at high volume levels. And as I said earlier, you'll reach the thermal limit before the mechanical limit with these speakers, unless you lean on them below the Helmholtz frequency. They're safe at that level, all day long.

What does the response curve look like with your current model?

Subject: Re: Alpha 10 modeling
Posted by rvsixer on Wed, 21 Dec 2011 02:53:19 GMT
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The revised response curve looks exactly like you had advised, quite flat with a smooth extended drop off. Also, at the SPL's I listen at the response is comfortably under xmax > 35Hz.

Understand I was in no way questioning the 2pi tower design or how it sounds, just trying to get a handle on sim's. When I saw what modeled xmax was doing I was a little shocked, which peaked my curiousity to understand it.

Thanks for the education. I'll feel a bit more comfortable now in using these programs, as I try to re-purpose some Peerless 12" SLS woofers into modal smoothing duty .

Subject: Re: Alpha 10 modeling

It's good to talk through stuff like this. That's what these forums are for.

I've designed some speakers that are price-no-object statement speakers, and I've gone to great lengths to reduce distortion to best-of-class levels. I've made some others that are good value speakers, providing good sound at a moderate price. And I have some models that are in between too.

speakers while offering superior clarity and detail. They're great for bedroom systems and surrounds. And you can push them pretty hard without making them sound strained. So for my way of thinking, they're perfect for that sort of offering.

If you're looking for less than 1% distortion at several hundred watts (and well over 100dB), I can provide that for you. Even at bass frequencies. But that kind of performance naturally costs

of sound. Don't need a lot of power to do it either.