Subject: High frequency dispersion and driver size
Posted by DanTheMan on Fri, 09 Mar 2007 21:48:57 GMT
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Does anyone nkow how to calculate when a driver of any particular size will start beamimg? I know I've read the formula somewhere before, but I can't find it. Also, does anyone know how to use this information to find how high a given driver will go before its high frequency response reaches 90degree or 80degree.......dispersion?Thanks!Dan

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Subject: Re: High frequency dispersion and driver size
Posted by Duke on Sat, 10 Mar 2007 00:42:32 GMT
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As a general rule of thumb, a driver's radiation pattern will narrow to about 90 degrees at the frequency where the cone diameter (or diaphragm dimension if non-circular) is equal to one wavelength. Cone break-up preserves a wider radiation pattern to a high frequency than if the cone were behaving as a rigid piston. A dome driver acts as an annular radiaton in breakup mode, which from what I understand also gives a wider pattern than rigid piston theory would predict but not as much so as a cone in breakup.If you want to get into mathematics that will describe real-world loudspeaker behavior rather that idealized rigid pistons, I recommend "Audio Transducers" by Geddes. Duke

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Subject: Re: High frequency dispersion and driver size
Posted by Wayne Parham on Mon, 12 Mar 2007 15:06:18 GMT
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A good "how-to" guide for sound system implementers is the Sound System Design Reference Manual, by George Augspurger. Chapter 3 is called "Directivity and Angular Coverage of Loudspeakers", and it discusses this topic in some detail.

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Subject: Cone flex and ripples, breakup modes
Posted by Wayne Parham on Mon, 12 Mar 2007 15:31:20 GMT
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I studied Geddes book "Audio Transducers" but don't recall him going into much detail about cone flex, or drivers in breakup. Please refresh my memory, what chapters he has written on it and what he said. I'll try to remember to re-examine that book this weekend when I get back to

Tulsa.To understand the movement of a cone in breakup, one would need to know the geometry and shape of the cone, as well as its material properties, stiffness, placticity, elasticity, etc.  The drive and mount points and stiffness of those would also have to be entered.  It would be possible to model something like this with finite element analysis but it would take a lot of input data parameters to adequately describe.

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Subject: Re: High frequency dispersion and driver size
Posted by DanTheMan on Mon, 12 Mar 2007 17:04:44 GMT
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Cool, thanks Wayne!

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Subject: Re: Cone flex and ripples, breakup modes
Posted by Duke on Mon, 12 Mar 2007 17:31:04 GMT
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He doesn't devote much English text to the subject.  Starting on page 72:"Most transducers do not have radiating surfaces which are rigid pistons and so it would be convenient to generalize the approach shown above to consider non-rigid piston behavior... [calculus calculus calculus... Duke doesn't speak calculus... reverting now to English on page 75]... The above result can be greatly simplified for the case where the source is axi-symmetric but still not a rigid piston - by far the most common situation... [less calculus]..."I can't comment on how complete Earl's mathematical model is.  That would be like me critiquing subjunctive tense conjugations in ancient Summarian poetry.Duke

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Subject: Re: Cone flex and ripples, breakup modes
Posted by Wayne Parham on Mon, 12 Mar 2007 19:22:21 GMT
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Gotcha, Duke, thanks.  That's kind of what I recall too.  Earl is a really smart guy, but I think what he wrote about cone motion painted a picture with very broad strokes.  It's kind of like providing an "analysis" of what's required to get a man on the moon by saying "build a rocket."  Not that cone flex is quite as complex as space travel, but you get my meaning.  It's one thing to admit that a loudspeaker cone isn't a rigid piston, another thing to estimate its average behavior in breakup with a small number of forumulas and still another thing to try and make an accurate model that actually describes the complex motion of its surface.  So while I think the world of Earl, I don't think we can credit him with modeling breakup modes just yet.

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Subject: Re: High frequency dispersion and driver size
Posted by hurdy_gurdyman on Thu, 29 Mar 2007 14:54:04 GMT
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This brings up something I've wondered about for some time. The simple way of calculating this by using driver size and frequency is what applies to a rigid piston (more or less). What about big wide range cone drivers that are designed to have the center part vibrate better at high frequencies, such as the ones using concentric rings in the cone? The highs coming out of the center are filtered out toward the edge of the cone. Does this make the center of the cone act more like a smaller driver and thus have wider dispersion than what the simple formula would predict? If so, would it be enough difference to be greatly noticed? I've wondered about this for some time, as I haven't noticed severe dispersion problems on twelve and fifteen inch drivers that are crossed way higher than common theory would suggest their limits are. Maybe it's just me.
Dave