Subject: Motors
Posted by Adrian Mack on Sat, 05 Jul 2003 00:09:08 GMT
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Hi everyone,I have a quick question on "Q". Qms, which is a measure of energy stored in the suspension will tell you the suspension damping. High Qms means low damping, and low Qms motors have better damping (so better cone control). It also seems that these high qms motors have rather poor magnets which cannot effectivly control them. And also a High QMS generally means a higher Qts (higher Qts meaning poor motor control). But then there are some woofers with high Qms, and also low Qts (probably because Qes is lowered by low Re). Since low Qts is regarded as having better motor control/stronger motors, this would mean cone control is better. So lets say we have a motor with Qms=15 and Qts=0.25 - would this have good, or poor cone control? The Low Qts would dictate better control, but the High Qms dictates poorer control, so I'm lost! I'm thinking motor strength is still low so poor cone control, this is because Qts is only low because Qes is. But this would mean defining low Qts as good motor control and high Qts as having poor motor control is not always the case.... hmmmm. BTW: Cone weight and motor strength are relevant to Qms; Which physical parameters are relevant to Qes?I have actually searched this forum for the answer, but cant find it as yet. Thanks!Adrian

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Subject: Re: Motors
Posted by Wayne Parham on Sat, 05 Jul 2003 01:34:18 GMT
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Qms is a term that desribes mechanical damping, much like the shock absorber on a car. Qes describes electrical damping, and is the ratio of series motor circuit resistance to the square of BL, an indicator of motor strength. The two are combined to form Qts, because they are parallel reactances. That's why speakers that require electrical motor damping aren't particularly good to use with amplifiers having low damping ratios. They can't effectively control the cone, and the values of Qes and Qts are highly effected by the amplifier's output impedance.There are equations that use Qts and Qms to find the value of Qes, and vice-versa. Since the speaker is a system that includes both mechanical and electrical reactances inter-related in the form of Qts, you can use any two terms to find the third. But Qes and Qms are caused by two completely different things, and are related together as Qts because they are part of the same system.

Subject: Re: Motors
Posted by Adrian Mack on Sat, 05 Jul 2003 04:51:39 GMT
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Hey Wayne,I think I understand now. So to sum things up:Mechanical Q = Mechanical

DampingElectrical Q = Electrical DampingTotal Q = Total Q (lol) or total damping. Motors with heavy cones and loose suspension (relation to Cms?) have High QMS, and are less damped (but lower Fs being the benifit). Generally higher Qms = higher Qts and it will have less cone control which is bad. But we can dampen the cone by "electronic motor damping" from amplifiers with high damping factor (therefore low output impedance, ~0.1ohm). We can only do this if Qes is low, and because Qes is the ratio of series motor circuit resistance to the square of BL, that means the motor will have low DC resistance too. This will lower Qes and hence lower Qts. The amp will have like 0.1ohm output impedance, so the amp will barely change Qes. Now the amp can control it because of Back EMF. A strong magnet also should be used. So in this case a High Qms with Low Qes will offer pretty good dampening for the driver if used on an amplifier with high damping factor. It would also be right to say a lower Qes will offer better dampening for the driver by the amplifier. If the woofer had high Qes (hence higher DC resistance) and also a high Qms, then basically, it is a piece of sh*t and has very poor damping, and theres not much we can do about it at all. It also has a poor magnet. If the amp was a tube amp, then Qes would increase heaps (therefore Qts as well) because of the amplifiers high output impedance. On semi-conductor amps (these are the normal ones?) output impedance is so low that Qes is barely affected. Qts is the combination of Qes and Qms. So when I asked before that low Qts doesn't always mean good motor control was wrong - lower Qts does mean better motor control, how it is damped is just different though in the example in my previous post. Am I grasping the situation right?Oh yea, just a quick question on the PiAlign program - I've been muckin around with it heaps, but for the Alpha 10 I got some rather strange results. It gave me an Fb of about 32Hz, and Vb of about 48L. Fs on Alpha 10 is 50Hz, I would think PiAlign wouldn't recommend tuning below Fs. Why is that, is there any advantage/disadvantage tuning below Fs? Thanks for all your help!Adrian

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Subject: Re: Motors
Posted by Wayne Parham on Sat, 05 Jul 2003 11:31:29 GMT
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You've got the deal about Q. And you've made the connection how back-EMF and amplifier characteristics come into play too. But there are a handful of applications where a high Q motors are well suited. Use as dipoles or in infinite baffles or very large chambers are examples.The alignment of a bass-reflex speaker cabinet sets a handful of significant frequencies to obtain a desirable overall response curve. The resonant frequency of the cone is shifted by the stiffness of the box. The box itself is another tuned system. And the interaction of these two tuned systems being so tightly coupled gives rise to two other significant frequencies, fl and fh. There's more about this in the post called "Behaviour of vented loudspeaker systems."