Subject: Impedance Peaks relating to damping and GD
Posted by Adrian Mack on Fri, 12 Sep 2003 22:03:55 GMT
View Forum Message <> Reply to Message

Hey Wayne and Mollecon,In the Behaviour of vented loudspeaker systems post of yours, at fl and at fh, impedance is very high. But at fb on a vented box, impedance is at its very lowest. Would this not dictate that system damping is the lowest here? In a sealed system, at resonance, impedance is highest. At fb, impedance is always a lot lower in a vented box than the sealed box is at resonance, which would seem that the sealed box offers better damping and less ringing at resonance. Mollecon said that larger boxes means less ringing (higher damping). I then wondered about PiAligned vented cabinets, because they use very small boxes. So I took out my box modelling program to look at the impedance curve, and found that, the two impedance peaks, fl and fh - when box size is large, the two impedance peaks are much closer togethor than when the box is small. But the smaller box also showed an impedance peak with less amplitude/lower impedance, but they were further apart. Its possible to get a vented box with fh at 60Hz, but use a crossover at 100Hz because we want to use it up to 100Hz. But anything above fh, the port does nothing, and therefore does nothing to stiffen the system/provide damping and impedance drops again. Then take a vented box with fh at 100Hz (this would have to be a smaller box), with crossover at 100Hz too, we can say this box has better damping between 60-100Hz than the larger one. But this is way away from resonance, and doesn't really matter then. So I guess, the thing that is (now) bothering me is that at resonance in a vented system, impedance is lowest, and that means lowest damping and highest ringing, to my knowledge anyway. But then comes marching-in that damn group delay curve included in so many computer simulation packages.... and if we go along Adires simple guideline of "Aim for below 25ms at 20Hz"... we can still get a vented system that has group delay at 20Hz which is way below 25ms... so thats a good thing. But that is the problem - the impedance curve shows lowest impedance at fb therefore lowest damping.... but the group delay curve still can show very low group delay here. ---- The sealed box I found always had slightly less group delay at resonance than the vented box did at the same point. I guess thats because impedance at resonance is way higher on the sealed system. This is comparing a Qtc=0.707 sealed box and PiAligned vented cab, which both have essentially the same response curve. But since the diff in GD was very minor, it seems that the larger impedance at resonance in the sealed box (meaning higher damping) does not do that much compared to the vented boxes very low impedance at resonance... they both had almost he same GD, and both systems had almost same response curve (has to be or we cant compare, it would make it unfair if they did not). So to sum up my ramblings in case they dont really make sense, they are:1: The vented system is damped most between fb and fh. Impedance is highest at fh so damping is highest here. At fb, impedance is still at its very lowest. That would dictate lower damping and therefore higher overring. The sealed box has highest impedance at resonance and therefore lower overring. Reflected back in the GD curve though, qtc=0.707 sealed box and PiAligned vented show roughly the same GD, only very small differences which do nothing. (This is all the stuff described in the last paragraph). 2: Mollecon said larger vented boxes means less ringing. But it can mean HUGE peak in Group Delay Curve near resonance. Does that not mean the larger box increases overring? 3: Is it better to use a smaller box which has larger distance between fl and fh, and therefore damping over a wider range than a larger box would?4: Larger boxes have higher impedance peaks, therefore more damping at fh (and fl but that doesn't matter they are out of phase). But as said before, the larger box can either show higher group delay near resonance, or if very larger, a massive peak in GD near resonance, then decreases on either side of this. Does this mean, the larger box provides better damping at fh, but not at fb and will ring

more at fb? A smaller box would shift resonance upward of course limiting bass extension... but as mollecon pointed out, the signal does not need to be that near resonance to be excited into ringing so its best to have a system which wont ring much no matter where resonance is. Thats why I'm thinking smaller vented boxes ring less than larger ones.... 5: Box size, large or small, barely changes impedance in ohms at Fb.... its a matter of about 2ohms between a huge and small box. Fb is where overring occurs. Smaller boxes show lower group delay at Fb. This would dictate that a smaller vented box has less overring than a larger vented box... but mollecon has said that its the opposite, and a larger box provides less ringing at resonance.