Subject: Re: Horn Mouth Diffraction
Posted by Martin on Fri, 07 Oct 2005 10:23:04 GMT
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Hi M,"This is my understanding, and please correct me, if I am wrong. There are (at least) two consequences associated with the transition from the boundary formed by a horn or a cone driver.A transition from the boundary constrained space to a 2 pi (if mounted on a baffle) or 4 pi (if radiating to free space), which is characterized by impedance mismatch, reflections, and resulting standing waves (ripples)."Yes I think we are saying the same things. A couple of minor additional points. First, you don't need a baffle to have a baffle step. The physical size of the driver or the mouth of a front loaded horn like the Oris will also produce a baffle step. The source diameter is in effect a baffle. So when I simulate something like an Oris horn or the mouth of a back loaded horn which is "framed" by an enclosure structure I still calculate a baffle step response.Second, I don't think the ripples are a result of standing waves. I believe they occur at frequencies for which the path lengths from all of the edge sources produce reinforcement (arrive in phase) or cancellation (arrive out of phase) of the summed response from the individual pressures from each source. If a standing wave response occured, I would expect these ripples to be more like sharp tall peaks and deep narrow nulls. "The second is diffraction on the edge of the boundary. Invoking Huygens'principle, the wave emanating from the boundary restricted space will interfere with the wave emanating from the edge of the boundary."Yes."I have an idea how to deal with the first one. Whether I am correct is to be seen. However, I am at loss how to deal with the other one, if I esclude various rules of a thumb. I understand that I am making a heuristic argument here, but it appears to me, that by a "proper" shape of the edge of the boundary, the interference could be minimized."What I should have stated clearly before is that my thoughts are primarily for full range drivers and in particular my collection of Lowther drivers. For a tweeter or small horn my thinking would be different, if I had done any thinking at all. At the frequencies where ripples contributed by the edge of a baffle, as seen in the EDGE program, the driver is becoming very directional. For larger horn mouths the directivity is even more pronounced. I am not sure that the ripple produced by different edge conditions, sharp or rounded, is the biggest problem to be solved. I guess I would consider edge treatments as a tweak and something to be experimented with on the completed speaker and probably not something I would include in the initial design calculations. Adding a radius porbably would not hurt the response but I would not highlight it as a feature in the design of the enclosure. As you may have already guessed, I don't have a calculation for a rounded edge on a baffle ..... yet.Martin