Subject: Re: Webster's equation verses FEA / BEM
Posted by Wayne Parham on Tue, 25 Mar 2008 22:11:33 GMT
View Forum Message <> Reply to Message

As you might imagine, you can make a horn model as simple or as complex as you want (and/or have the programming and processing power for). The simplest models assume linear motor properties, rigid piston diaphragm motion and constant cross-section pressure with wavefront propogation being perpendicular to the flare walls. Better models allow any wavefront shape and include standing wave nodes, rarefactions, diffractions and reflections. Even better to add the ability to model motor nonlinearities with respect to inductance, flux modulation and compression. Better still to include the materials and geometry of the diaphragm, so flex can be modeled.Are models that don't include all these features wrong? Well, yes, I suppose in the strictest sense, they are. But then again, there aren't any fully complete models that I know of. So I guess that means all analysis is wrong. Maybe it is better to say our best models are still incomplete, but getting better all the time.Even the simplest models are and can be useful, if you know their limits and what you're looking for. As an example, a model that doesn't includes diaphragm flex can't predict breakup modes so high frequency prediction is off, usually way off. But a rigid piston model predicts low frequencies just fine, where the diaphragm moves as a piston.As you know, computer technologies tend to evolve pretty quickly. It is the fastest growing technology I can think of. These kinds of tools are all based on computers, so our ability to make complex models is getting better all the time. Think about what computer graphics processing we could do in 1980. The fastest processors in the world with the most sophisticated graphics boards would barely make a decent scanline image. The best stuff was vector graphics back then, nothing in terms of ray tracing was being done. We just didn't have the horsepower. Today you can do things on a desktop computer that you couldn't have done on the best workstation 10 years ago, or the biggest mainframes of 25 years ago.This kind of reminds me of the evolution of understanding of heavenly bodies. There was a time people thought the earth was the center of the universe. When that model failed to explain why planets moved in retrograde at some times, they added epicycles to improve the model. Was this right? No. Was it an improvement? Yes. But in the end, people realized the earth wasn't the center, and putting the sun in the center made a much better model.Same thing with our understanding of horns, I expect. Someone makes a model and we use it for a while. Someone later adds features to improve the model, and we use that. At some point, we gain a better understanding and the model changes again. In the process, sometimes weird artifacts pop up like epicycles that seem to explain certain things, but may not be right at all. Still, if the model fits reality to some degree, then to that degree it is useful.