Wavelength and Doppler (was Re: Basic Acoustic Derivation/Proof Needed)

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From: Jim Carr (*jim_at_azwebpages.com*)
Date: 10/09/04

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"RP" <no_mail_no_spam@yahoo.com> wrote in message
news:2sqt5tF1nlorkU1@uni−berlin.de...

> Of course direction cannot be discounted, which is why the equations
> that I posted refer to the velocities rather than to the scalar speeds.
> In hindsight, my last statement above should have read:
>
> wavelength = u/freq
>
> is only valid when the frequency is that measured by a detector or
> source that is at rest wrt the medium, or that is in motion at 90 or 270
deg
> wrt the projected ray (in which case cos_theta = 0).
> Or IOW, when (cos v) = 0.

Which agrees with what I was saying, though I admit to never seeing your formulas with cos before. Like I said, this is not my field. If it's okay I'm gonna assume the medium doesn't move for the purposes of this discussion.

> But I have no idea what "apparent" wavelength and frequency is supposed
> to mean, except maybe that the observer was "apparently" wrong about one
> or the other :)

Which, again, agrees with my point. I'll attempt to address "apparent wavelength" if you'll bear with me to the end before responding. You and I are not in disgreement. I'm ignoring Porky.

We take the simple wavelength = u/freq formula with everything at rest and we see an inverse relationship between frequency and wavelength. I never disputed that. It's not unique to waves. If automobiles driving at 10 feet per second pass us at a rate of two per second, we can calculate the distance between the cars. It's just grade school algebra that even I can do. Of course, we'll have to measure the same point on each car such as the front bumper (gotta be precise with you physics guys).

So, as we discussed Doppler shift, I got to thinking about what was really happening. If my source is moving, then the physical distance between two waves is the speed of the waves times the time interval between waves plus or minus the speed of the source times the time interval. With a stationary receiver and medium we can mathematically derive the frequency at which the receiver encounters the waves. Again, I believe we agree on this part.

But as I was