

Voigt Transformation

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In 1887 Voigt tried to derive universal formula for Doppler effect in case of a stationary observer and moving source in an elastic incompressible medium [1]. The simple problem was treated in a very complicated way. Solving the set of equations, Voigt found the Doppler formula which was already well-known. Some authors wrongly claim that Voigt proposed the constancy of speed of light in his derivation [2, 3]. Since Voigt's transformation describes all waves as for example electromagnetic waves, sound waves, and water waves, it is simply not the case [4].

We see from the figure 1 that the coordinates of the wave sphere in both systems are:

$$\begin{aligned}x &= ct \\y &= ct \\z &= ct\end{aligned}$$

$$x' = (c - v)t = x - vt$$

$$y' = ct \sqrt{1 - \frac{v^2}{c^2}} = y \sqrt{1 - \frac{v^2}{c^2}}$$

$$z' = ct \sqrt{1 - \frac{v^2}{c^2}} = z \sqrt{1 - \frac{v^2}{c^2}}$$

Voigt regarded only the Doppler effect on the x-axis and he receives:

$$t = \frac{x}{c}$$

$$t' = \frac{x'}{c} = \frac{x - vt}{c} = t - \frac{v}{c}t$$

That means t is the time the front of a wave needs to arrive to the position x if emitted from the origin of the stationary system. During that time the source has moved to the position vt and the travel time of the end of the wave for moving source t' is accordingly shorter than the time t for the stationary source, simply because the distance to the stationary observer is shorter. At this point Voigt made a mistake which has led to misinterpretation of the Doppler effect and to various misconceptions in the physics – he has replaced t by x/c in the last formula according to the definition of the new variables:

$$t' = t - \frac{v}{c} \frac{x}{c} = t - \frac{vx}{c^2}$$

The replacement of t by x/c is mathematically correct but physically incorrect because the meaning of the formula - or at least the interpretation - can be falsified. The Relativists have indeed used this Voigt's blunder to create the "spacetime" and the total destruction of physics was initiated.

Doppler effect was for Einstein obviously an unsolvable problem. He was not able to explain the meaning of x/c in the last formula. In his 1905 paper Einstein tried to combine Voigt's and Lorentz's findings and failed. Finally, he introduced so-called gamma factor and "solved" the problem ad hoc. After Einstein's manipulation the Doppler formula has changed its meaning and the fundamental physical quantities, space and time, was declared by Einstein as invalid. In fact, Einstein tried to calculate mean value of the overall Doppler effect regarding separately propagation of light along x-axis and y-axis. Voigt and Lorentz transformations are only applicable if the wave source (or charged body) is moving relative to transmitting medium. If empty space is regarded, none transformation can be applied because the waves cannot travel through empty space. In this case Newton's mechanics and so-called emission theory would be valid.

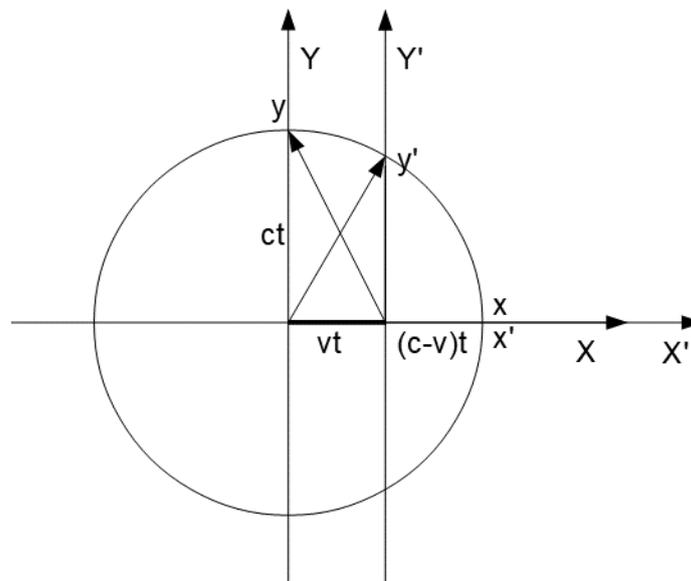


Figure 1: Propagation of waves in a stationary medium (water, air, ether, etc.) emitted from a moving source. Moving coordinatesystem is attached to the wave source. The observer is positioned at the point x/x' at the time t (snapshot).

Voigt "transformation" i.e. the Doppler formula is universally valid for all types of waves. The transformation describes Doppler effect for a moving source in the stationary medium. It is clear that in the reference frame stationary to the medium c =constant is always valid, independent of the motion of the source. By the motion of the source, the wave length and the wave period are changed whereas the ratio (quotient) remains always the same, what Einstein strangely interpreted as length contraction and time dilation.

References

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4. W. Lange, *Über die Voigt-Transformation*, (2011).