Doppler effect of time-varying velocities and its applications[1]

QIAN CHEN, International Education Foundation — Currently, all Doppler effect formulas don't include the timing of velocity. Hence, its application includes the implicit assumption of a constant velocity during the period from the light emission to measurement. A time-varying Doppler effect formula is mathematically derived from the principle of constant light speed, which is consistent with the classical and the redshift formulas. This formula is also supported by existing experiments and theoretically proved by Maxwell's wave equations. This paper shows that the Doppler effect is the result of the time scaling factor between the light emission time and the observation time caused by the varying propagation delay. The cosmological redshift can be explained with the same time scaling factor. Hence the time varying Doppler effect and cosmological redshift can be represented in one single formula. The Doppler effect is of great use in astronomy. Since the light from remote stars detected from Earth may be from millions of years ago, it is difficult to assume that these stars kept moving at constant velocity for the long period. The potential application of this time-varying Doppler effect formula in cosmology is discussed with the examples of cosmological redshift and Hubble's law.

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