Analysis Anomalous Doppler Effect from quantum theory to classical dynamic theory

Introduction:

The Anomalous Doppler Effect (ADE), where the observed frequency shift behaves contrary to the conventional Doppler Effect under certain conditions, was first theoretically predicted by the Soviet physicist Vitaly L. Ginzburg1. This effect could cause the moving system transfer it’s kinetic energy to it’s internal energy and at the same time emit radiation while the system speed is higher than light in the medium . An interesting example given on noble lecture2 by Frank on 1958 is that the radiation occurs not during the transition from the upper , i.e. exited state into the lower ,as in a general case, but quite the contrary , from the lower into the upper state, the energy being supplied form kinetic energy of the translational motion of the system. That interesting theory predication attracts great attention and research on it. In 1967, ARTSIMOVICH find that when he measured the electron temperature based on the diamagnetic signal and electrical conductivity3, the diamagnetic signal would infer more electrical resistance than measured one, that should be the firstly observed the ADE without realized it , Until 1968. B. B. KADOMTSEV point out that is caused by ADE and given a detail analysis for that phenomenon4.

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2. Frank, I. M. "Optics of Light Sources Moving in Refractive Media: Vavilov-Cherenkov radiation, though interesting, is but an experimental instance of a more general problem." *Science* 131.3402 (1960): 702-712.
3. Artsimovich, L. A., et al. "Thermal insulation of plasma in the “Tokamaks”." *Soviet Atomic Energy* 22.4 (1967): 325-331.
4. KADOMTSEV B, POGUTSE O. Electric conductivity of a plasma in a strong magnetic field [J]. Sov. Phys. JETP, 1968, 26: 1146.