

Issue: The formula for drift velocity given in Concepts of Physics (Vol 1) Sec 32.2 on Pg. 173 is

$$v_d = \frac{1}{2} \left[\frac{eE}{m} \right] \tau \quad (1)$$

where E is electric field and τ is average time between successive collision (also called relaxation time). On the other hand, the formula given in NCERT Class 12 Part 2 Sec 3.5 Pg 98 Eqn 3.17 is

$$v_d = \left[\frac{eE}{m} \right] \tau. \quad (2)$$

The readers get confused which one of these formulae is correct.

Discussion: The confusion on drift velocity definition is not new. It was discussed by many authors e.g., see Eur. J. of Phys. **30** (2009) 1–12 given here http://www.cce.ufes.br/jair/estsolpg/EurJPhys30_01_2009_Jakoby_Collision_Time.pdf. Equation (7) and (8) in this article clearly show the inherent confusion. The definition of drift velocity requires concepts from statistics (e.g., expected value, probability distribution etc.) which is generally not taught at school level. The formula (2) given in NCERT is commonly accepted in physics community. However, it is mostly a matter of convention and does not affect the analysis.