

2. We adapt the discussion in the text to a moving two-dimensional collection of charges. Using σ for the charge per unit area and w for the belt width, we can see that the transport of charge is expressed in the relationship $i = \sigma vw$, which leads to

$$\sigma = \frac{i}{vw} = \frac{100 \times 10^{-6} \text{ A}}{(30 \text{ m/s})(50 \times 10^{-2} \text{ m})} = 6.7 \times 10^{-6} \text{ C/m}^2 .$$