Answer on Question #61625-Physics-Other

An electron's position is given by vector r = 2.91t (i hat) - 4.01t2 (j hat) + 2.04 (k hat), with t in seconds and vector r in meters.

At t = 1.97 s, what is the magnitude of vector v?

Solution

$$\boldsymbol{r} = 2.91t\,\hat{\imath} - 4.01t^2\,\hat{\jmath} + 2.04\,\hat{k}$$

$$\boldsymbol{v} = \frac{d\boldsymbol{r}}{dt} = 2.91\,\hat{\imath} - 4.01(2t)\hat{\jmath} + 0\,\hat{k} = 2.91\,\hat{\imath} - 8.02(t)\hat{\jmath}$$

$$\boldsymbol{v}(1.97) = 2.91\,\hat{\imath} - 8.02(1.97)\hat{\jmath} = 2.91\,\hat{\imath} - 15.80\,\hat{\jmath}$$

The magnitude of vector v is

$$v = \sqrt{(2.91)^2 + (-15.80)^2} = 16.07\frac{m}{s}.$$

Answer: $\mathbf{16.07}\frac{\boldsymbol{m}}{\boldsymbol{s}}$.