Modeling attenuation

An object with initial velocity $v_0$ is observed to grind to a halt during the time interval $0 < t < \tau$ according to the empirical law,

$$x(t) = \frac{1}{3} v_0 \tau \left[ 1 - \left( 1 - \frac{t}{\tau} \right)^3 \right],$$

where $\tau$ is a constant. Construct the equation of motion in the form $m\dot{v} = f(v)$.

**Solution:**