[tex68] Average force of particle beam on heavy hard sphere

Consider a heavy hard sphere of radius R moving with velocity $\mathbf{u}$ in the path of a single-velocity beam of light particles (mass m, velocity $\mathbf{v}_0$, density n_0). Show that the average force exerted by the beam on the sphere is

$$\mathbf{F} = \pi m n_0 R^2 |\mathbf{v}_0 - \mathbf{u}|(\mathbf{v}_0 - \mathbf{u}).$$

Solution: