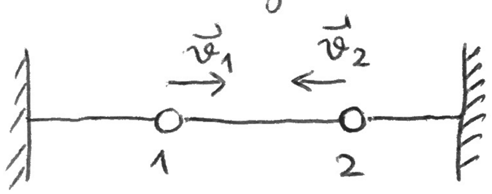
HW#3

1. Show that $\alpha + \beta = 1$ in the ballistic annihilation problem:

$$n(t) \sim t^{-\alpha}, \quad v_{rms}(t) \sim t^{-\beta}$$

(3.60)

2. Consider inelastic collapse in the system of 2 particles:



The particles collide inelastically with one another but elastically with the walls. Both particles have $m=1$, and particle-particle collisions are characterized by the dissipation parameter ϵ defined in (3.71). Use the eigenvalue analysis outlined in the section "inelastic collapse in 1D" (3.75) to argue whether there is a critical value ϵ_c separating inelastic collapse & finite collision sequence regimes. Discuss $\epsilon \to 0$ (elastic) & $\epsilon \to \frac{1}{2}$ (fully inelastic) limits.

(3) Show that

$$P(v,\tau) = \frac{2}{\pi\sqrt{T}} \frac{1}{\left(1+\frac{v^2}{T}\right)^2} \qquad (3.84)$$

satisfies the BE *exactly* at

[(3.77) rewritten in terms of τ]

all times. Thus (3.84) represents its steady-state solution.