DOE HEDLA
Jet Project
(CRMF:)

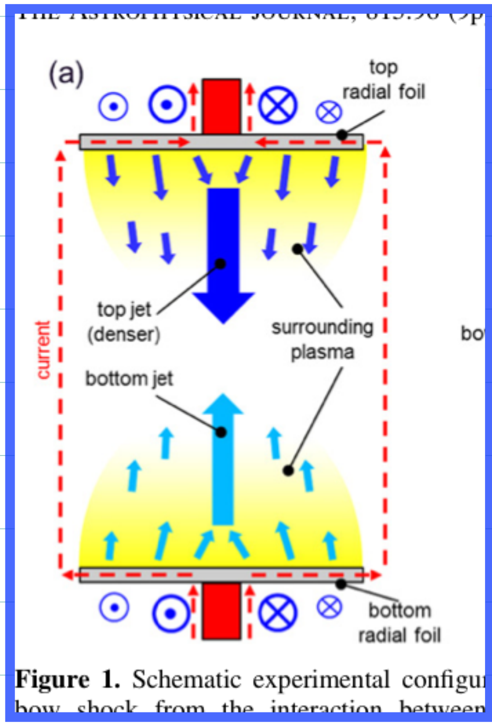
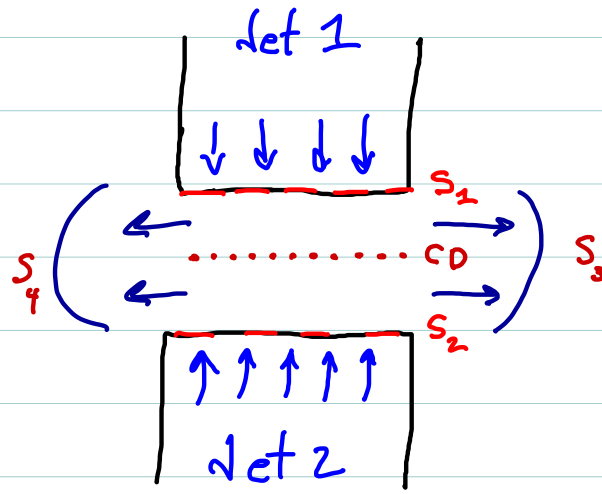


Figure 1. Schematic experimental configu...

Basic Flow, no cooling



S_1 = Jet 1 shock
S_2 = 2
S_3 = Ambient shock 1
S_4 = " " 2
CD = contact disc.

Initial conditions

ρ_a, T_a Ambient

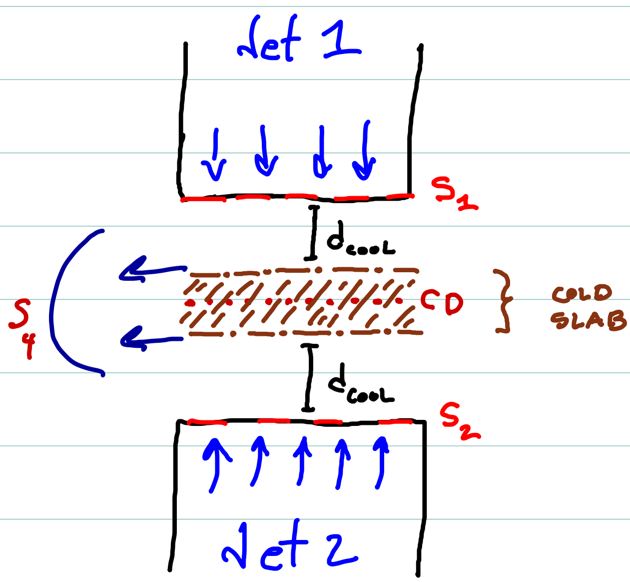
ρ_1, T_1, V_1

ρ_2, T_2, V_2

Project 1: Symmetric (equal) Jets
Different cooling curves

$$C(n,T) = n^2 \Lambda(T) \quad \left[\frac{erg}{cm^3\, s}\right]$$

$$\boxed{\Lambda(T) = \alpha T^\beta}$$

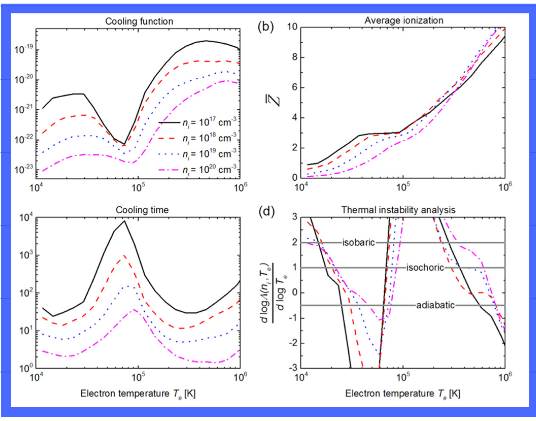


Q: stability of cold slab vs cooling function

β!

Thermal Instability

From Suzuki et al → Field '65, Hunter '70
Balbus '86



$$\frac{d \log \Lambda}{d \log T} < 2$$

$$\beta < 2$$

Radiative Shock Instab

From Blondin + Strickland '95

$$\beta < .4 \text{ or } .8$$

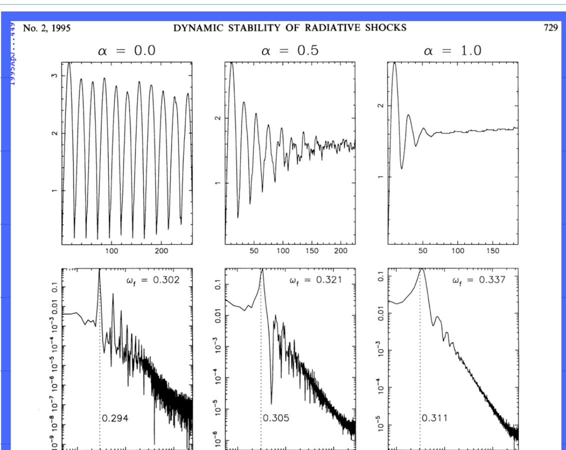


FIG. 1.—Results of one-dimensional flow into a wall simulations. The top row depicts the position of the shock front (in units of L_c from the wall) vs. time (in units of x_b/v_0). The $\alpha = 0.0$ simulation does not exhibit the growth predicted in the linear regime, nor should we expect that it would since the initial conditions are very different from the steady state. The bottom row consists of the power spectra for the three runs. Power spectra peak values, ω_f, are given in units of v_0/x_b for each value of α, and frequencies reported by CI are noted with the dashed lines.

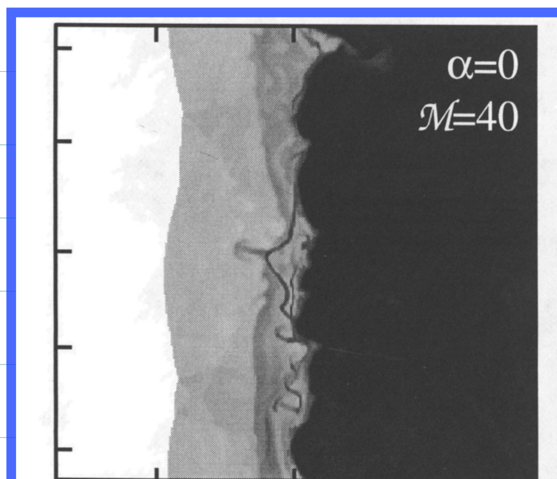


FIG. 7.—Characteristic structure in the nonlinear evolution of four radiative

V_s = shock speed $\cong V_{JET}$

- $$T_s = 2\frac{(\gamma-1)}{(\gamma+1)^2}\frac{m_H}{k}V_s^2$$

- $$t_{cool} = \frac{N_s k T_s}{N_s^2 \Lambda(T_s)} \propto \frac{T_s^{1-\beta}}{N_s} \propto \frac{V_s^{2(1-\beta)}}{N_s}$$

- $$d_{cool} = \frac{1}{4} V_s t_{cool} \propto \frac{V_s^{3-2\beta}}{N_s}$$

Thus $V_s = V_J \rightarrow d_{cool}$

Note we want $M = \frac{d_{cool}}{\Delta x} \gtrsim 20$

Simulation Campaign

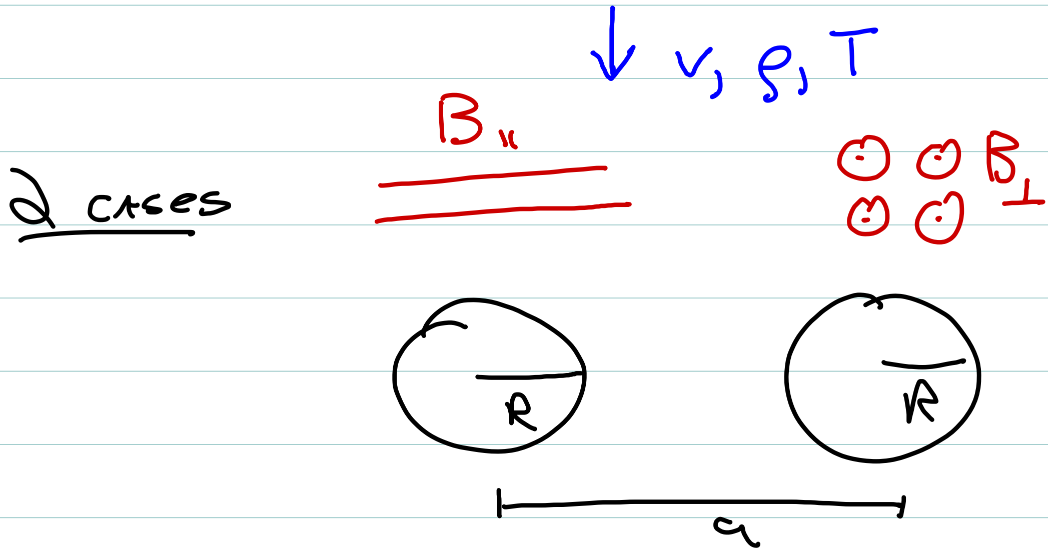
1) Vary β: Cooling function

$$[-2.5, -1.5, -.2, 0, .2, 1.5, 2.5]$$

2) Vary $M = \frac{V_J}{c_J}$ $[3, 15]$

Problem 2

Magnetized flow over 2 clumps



Question about clumps as boundary conditions...

Atma's problem.