

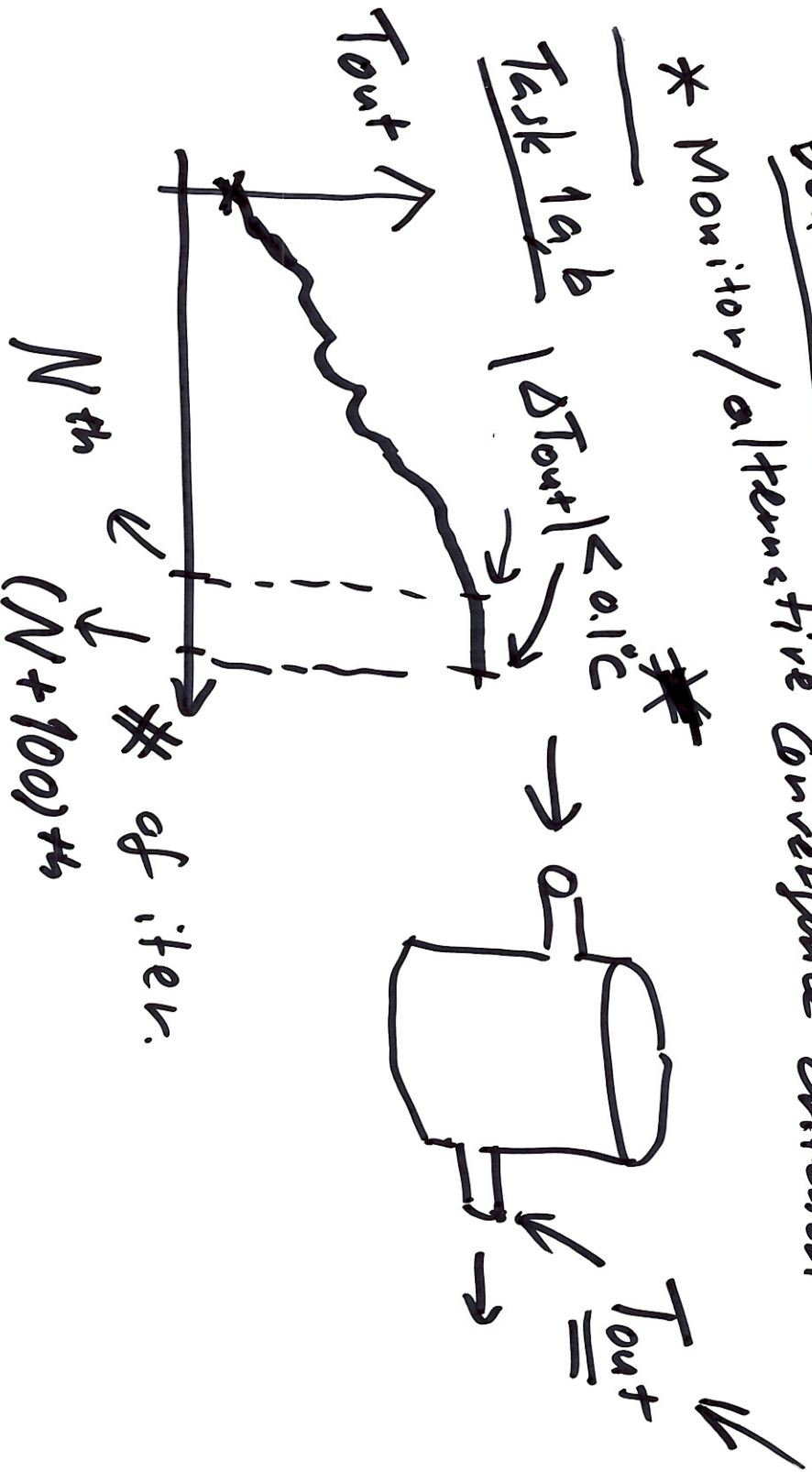
Recap (Lec 10)

Demo: setup mesh (local refinement)

Boussinesq.

* Monitor / alternative convergence criterion

Task 9a



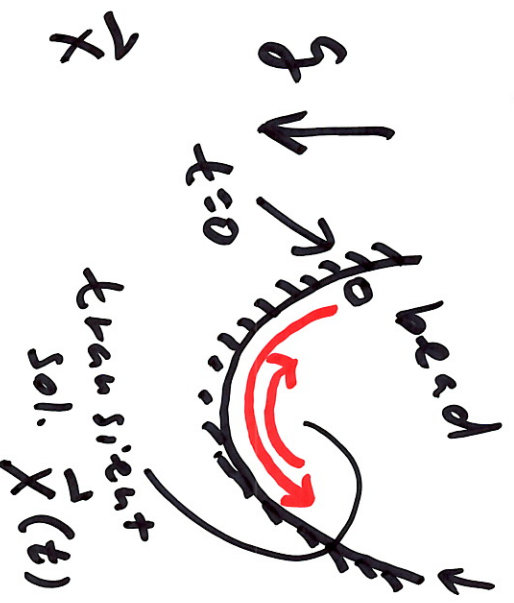
Proj 1 Task 2

Task 2b: Transient sol.
vs
Steady

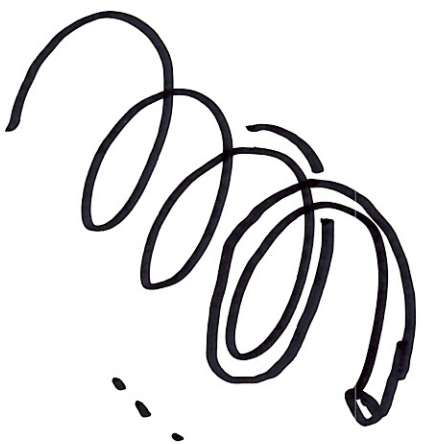
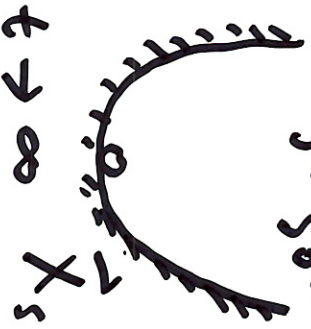
Steady

Mechanics

friction



Steady sol.

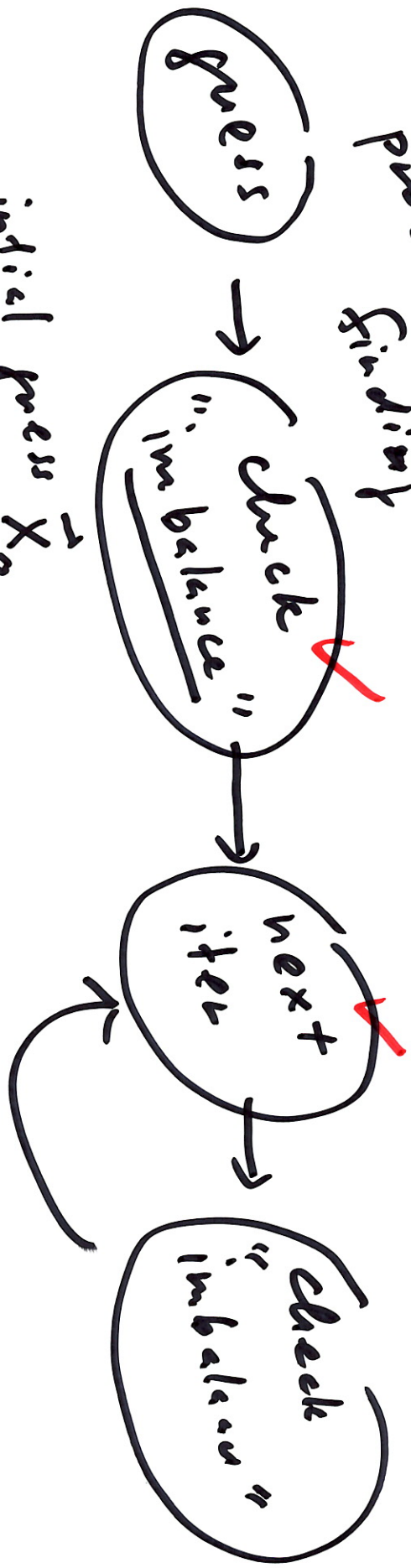


residual

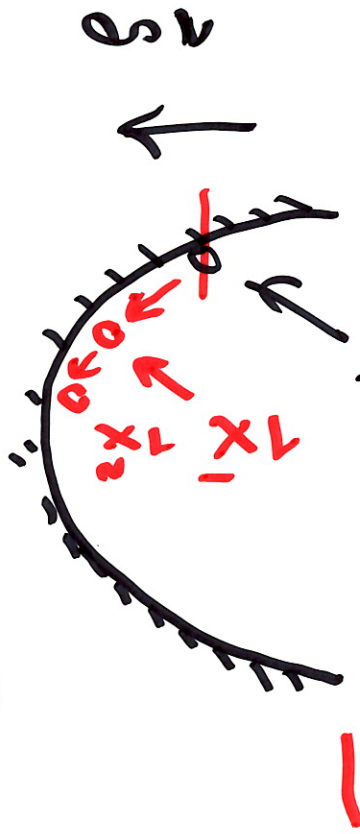
scaled residual

Iterative process for s. sol.

proceeding finding



initial guess \vec{x}_0



plug \vec{x}_0 into $(*)$

$$m \frac{d^2 \vec{x}}{dt^2} = \vec{F}_{\text{fric}} + \vec{g} + \vec{F}_{\text{Supp.}} \quad (*)$$

\vec{x}^*

imbalance

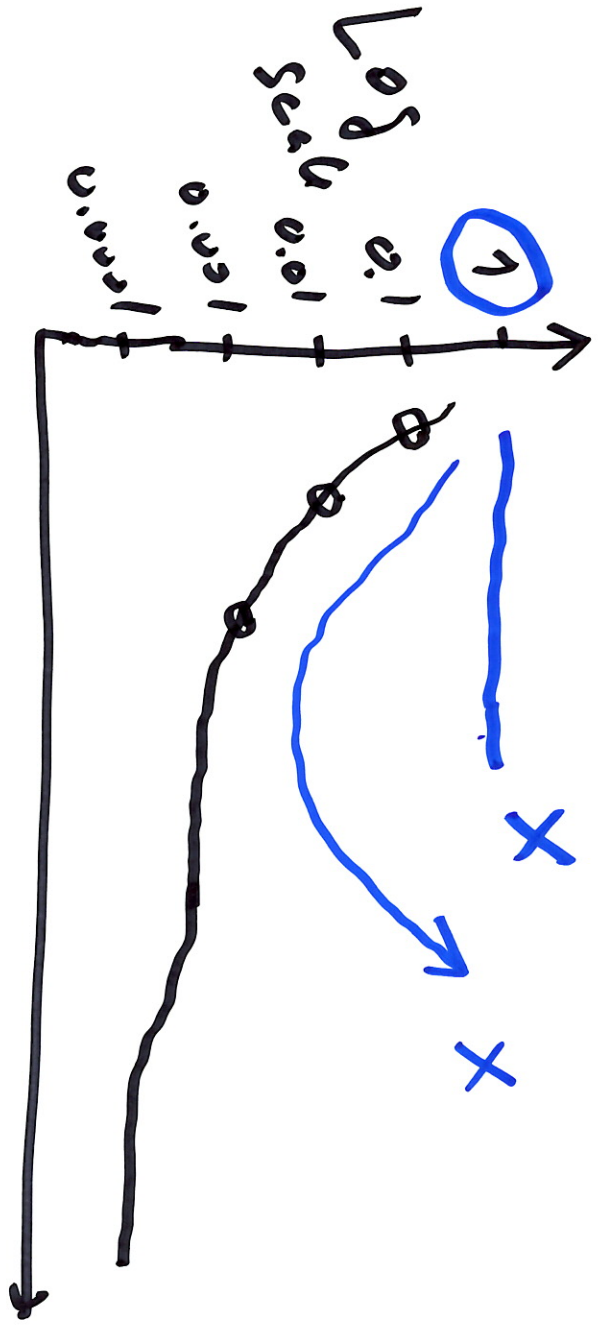
"residual"

"scaled" residual

normalized

Fluent Scaled Residuals Plot

(u, v, w, p, \dots)

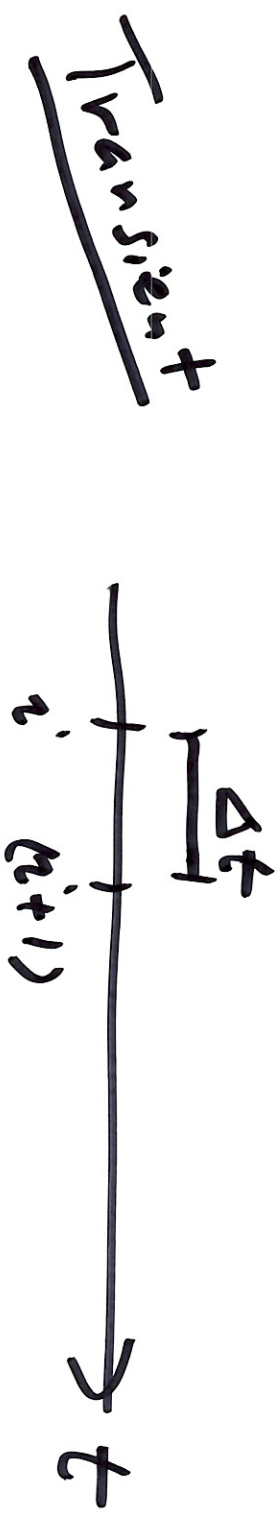


— x-velocity Steady Sol

x-moment ρ

$$\rho \theta = -\nu \frac{\partial u}{\partial x} - \nu \frac{\partial v}{\partial y} - \nu \frac{\partial w}{\partial z} - \frac{1}{\rho} \frac{\partial p}{\partial x} + \nu \left(\frac{\partial^2 \theta}{\partial x^2} + \frac{\partial^2 \theta}{\partial y^2} + \frac{\partial^2 \theta}{\partial z^2} \right)$$

(*)



$$\frac{\partial u}{\partial t} = -u \frac{\partial u}{\partial x} - v \frac{\partial u}{\partial y} - w \frac{\partial u}{\partial z} - \frac{1}{\rho} \frac{\partial p}{\partial x} + \dots$$

time \Downarrow

$$\frac{u^{i+1} - u^i}{\Delta t} = \{RHS\}^{i+1}$$

$$u^{i+1} = u^i + \{R.H.S.\}^{(i+1)} \cdot \Delta t$$

of iter done with is Δt sum all

Residual \leftarrow discrepancy for only \uparrow increment in time