LaMEM short course

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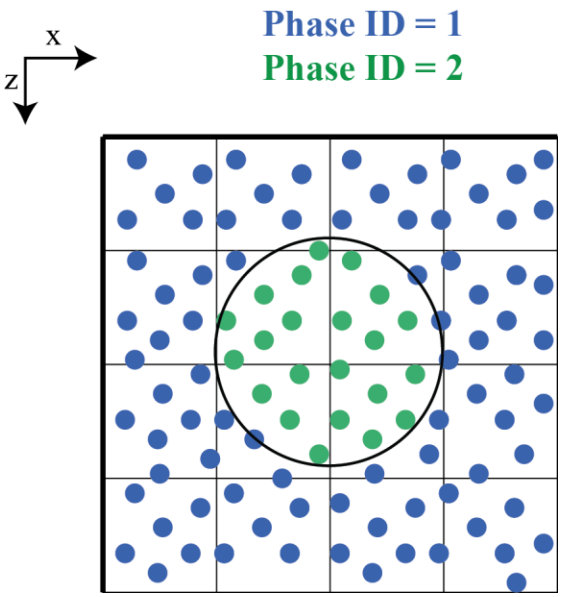
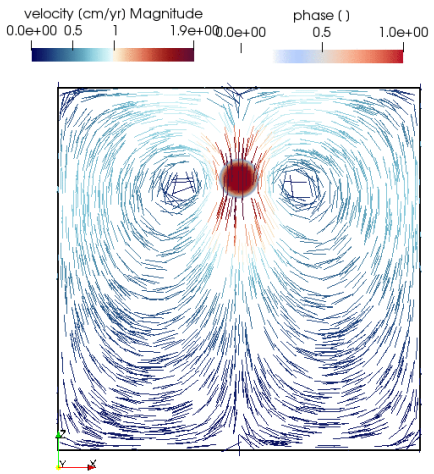
Material definition (internal condition)

- **Particles store**
  1. Phase ID
  2. Initial Temperature





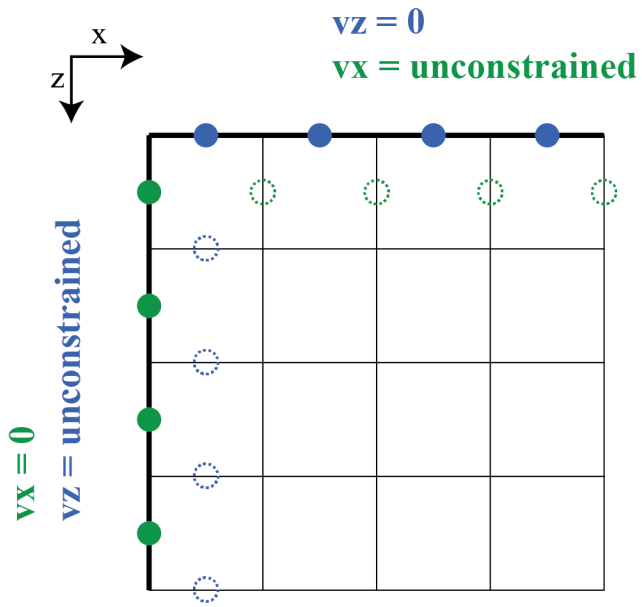
Phase() is a “rock” with a unique ID to which is attached:

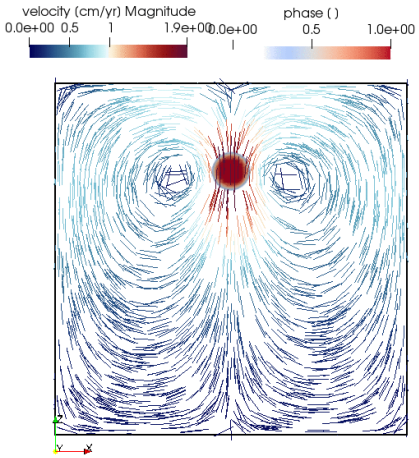
- Phase ID: A geometry defined by a set of particles
- Rheology: visco-elasto-viscoplastic
- Density: P and/or T dependent or a diagram
- Thermal properties: alpha, cp, k
- Elastic bulk modulus...

Particles are transported using the velocity field

Mechanical Boundary conditions

- **Free slip**

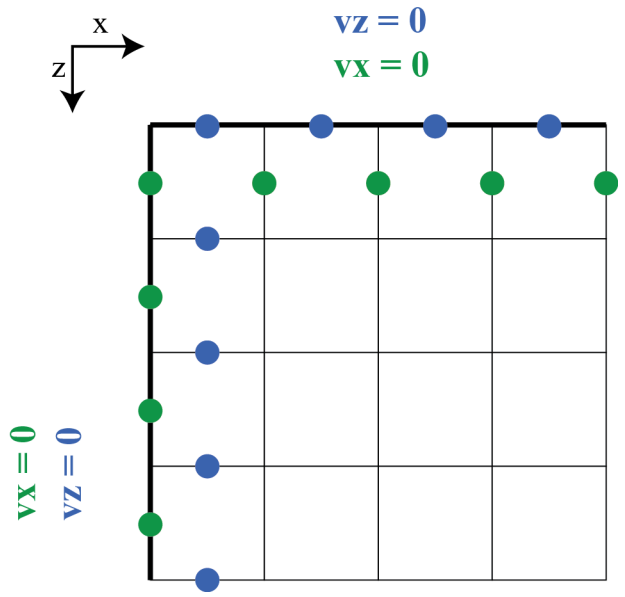




- Material is bound the box but can freely move along boundaries

Mechanical Boundary conditions

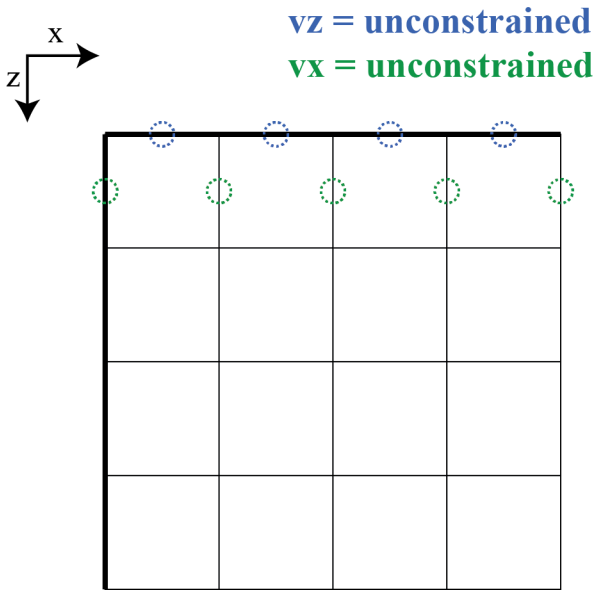
- **No slip**



  - Material is bound the box but has a zero velocity along boundaries

Mechanical Boundary conditions

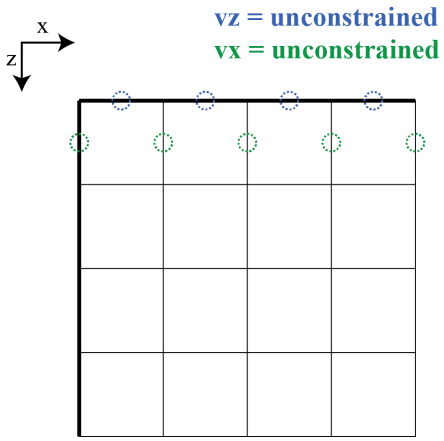
- **Open top (for free surface)**

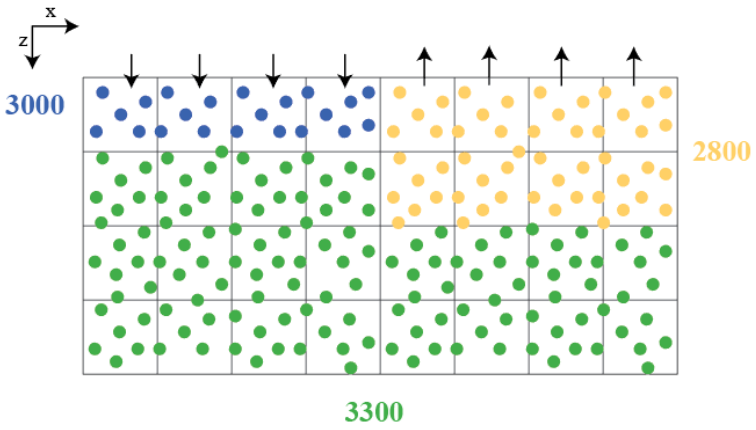


- At the top boundary material is allowed to exit and enter
- This is done together with a low viscosity/density “air” layer

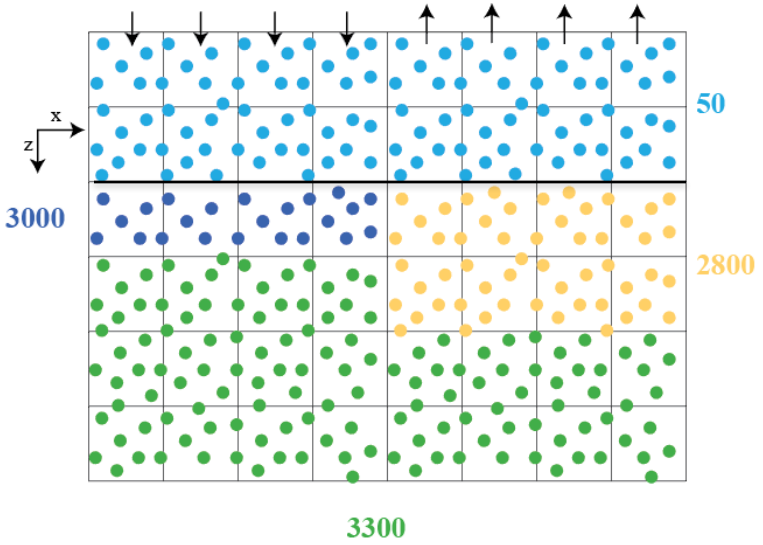
Mechanical Boundary conditions

- **Free surface: “sticky air”**





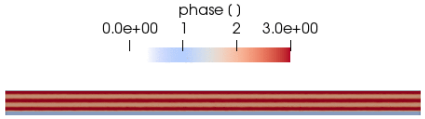
Not ideal!

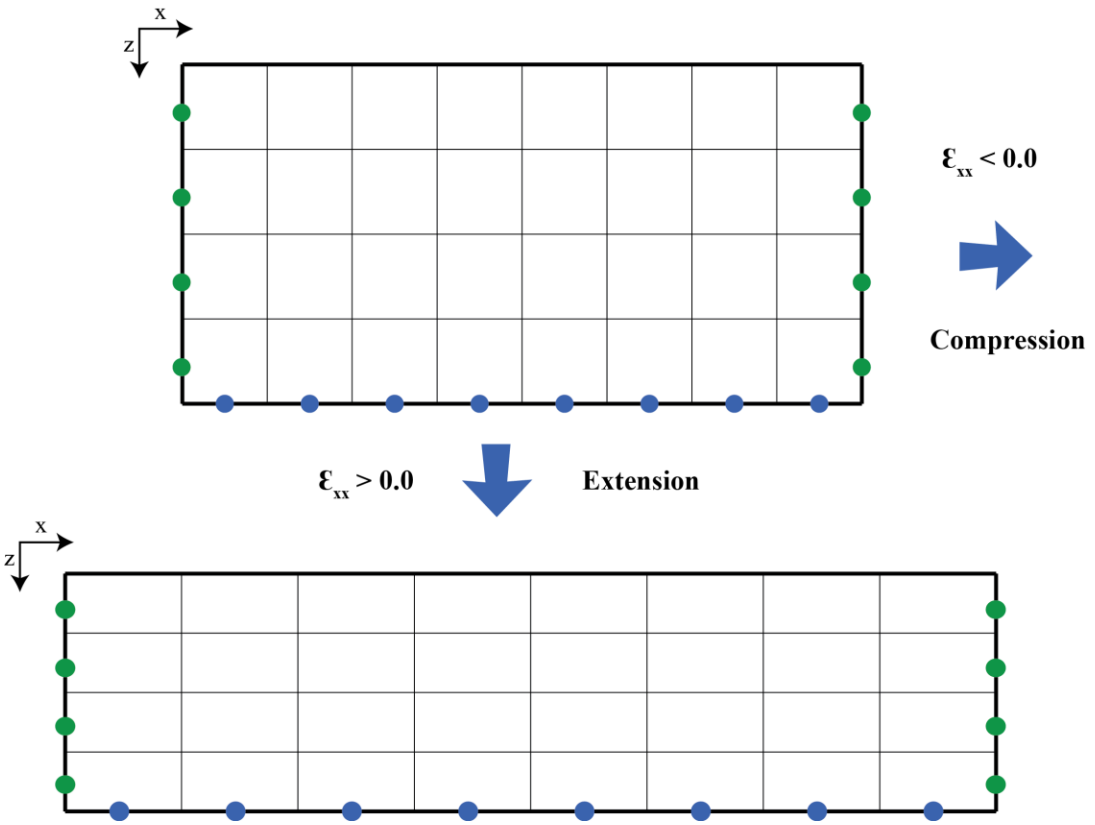


Better!

Mechanical Boundary conditions

- **Strain-rate [1/s] = velocity/distance**

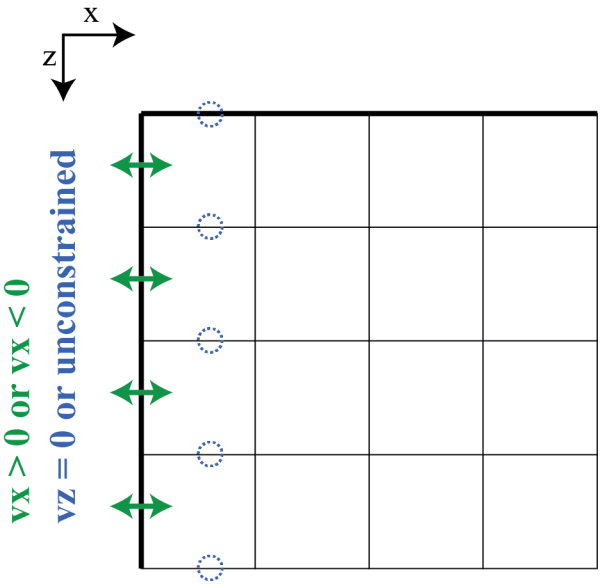




- Whole box is deformed according to given direction while keeping top boundary at a constant vertical coordinate

Mechanical Boundary conditions

- **flux**



  - This allow to prescribe an “inflow” or “outflow” velocity across boundaries