[12:39] Tobias Keller

* calculate compaction pressure and segregation velocities separately before solving Stokes equations using (in mock code) P\_cmpt = - eta/phi (diff(W,1)/dz + diff(U,2)/dx) w\_segr = - kphi/mu (diff(P,1)/dz + Delta rho gz) u\_segr = - kphi/mu (diff(P,2)/dx + Delta rho gx)
* on RHS for momentum and equations include the compaction pressure gradient and the segregation velocity divergence
* RHSz = rho gz + diff(P\_cmpt,1)/dz RHSx = rho gx + diff(P\_cmpt,2)/dx RHSp = diff(v\_segr,1)/dz + diff(v\_segr,2)/dx
* then using the new stokes velocity and pressure, recalculate compaction pressure and segregation velocity and stick those back into the RHS vector. as initial guess, calculate the two-phase quantities with stokes velocity and (dynamic) pressure equal to zero. that will produce P\_cmpt = 0, and v\_segr = -kphi/mu Delta rho g, which are both good initial guesses.

[12:41] Tobias Keller

for simplicity of notation I tend to group together the coefficients for these equations into

zeta = eta/phi  (the compaction coefficient)

KD = kphi/mu (the segregation coefficient)

[12:43] Tobias Keller

to clarify, the way I wrote the above assumes that the dynamic Stokes pressure is used

P = Ptotal - rho\_ref g

and the density difference driving segregation then becomes

Delta rho = rho\_melt - rho\_ref

kphi is the permeability typically calculated as

kphi = k0 \* phi^3 , with k0 = (avg. grain size)^2/100 ~ 1e-9–1e-6 [m2] in our context