Model making

Cycle
Level 1 variables

- ✓ cycle #
- ✓ stiffness
- ✓ damping
- nonlinear component
- stiffness fraction

foam
Level 2

- ✓ initial stress
- ✓ " strain
- ✓ freq
- ✓ amp
- ✓ porosity
- ✓ chem index
- ✓ ID

stiffness fraction – response
freq, amp, chem index, cycle#, porosity

level 1: $Y_{ij} = a_i + b_i \cdot \log(\text{cycle}) + \varepsilon_{ij}$, attach ID to cycle in R

level 2:

$$a_i = \alpha_0 + \alpha_1(\text{freq}) + \alpha_2(\text{amp}) + \alpha_3(\text{chemID}) + \alpha_4(\text{porosity}) + \alpha_5(\text{porosity}\cdot\text{chemID}) + u_i$$

$$b_i = \beta_0 + \beta_1(\text{freq}) + \beta_2(\text{amp}) + \beta_3(\text{chemID}) + \beta_4(\text{porosity}) + \beta_5(\text{porosity}\cdot\text{chemID}) + v_i$$

$$Y_{ij} = \alpha_0 + \alpha_1 \text{freq} + \alpha_2 \text{amp} + \alpha_3 \text{chemID} + \alpha_4 \text{porosity} + \alpha_5 \text{porosity}\cdot\text{chemID} + (\beta_0 + \beta_1 \text{freq} + \beta_2 \text{amp} + \beta_3 \text{chemID} + \beta_4 \text{porosity} + \beta_5(\text{porosity}\cdot\text{chemID}))\cdot\log(\text{cycle}) + u_i + v_i \log\text{cycle} + \varepsilon_{ij}$$