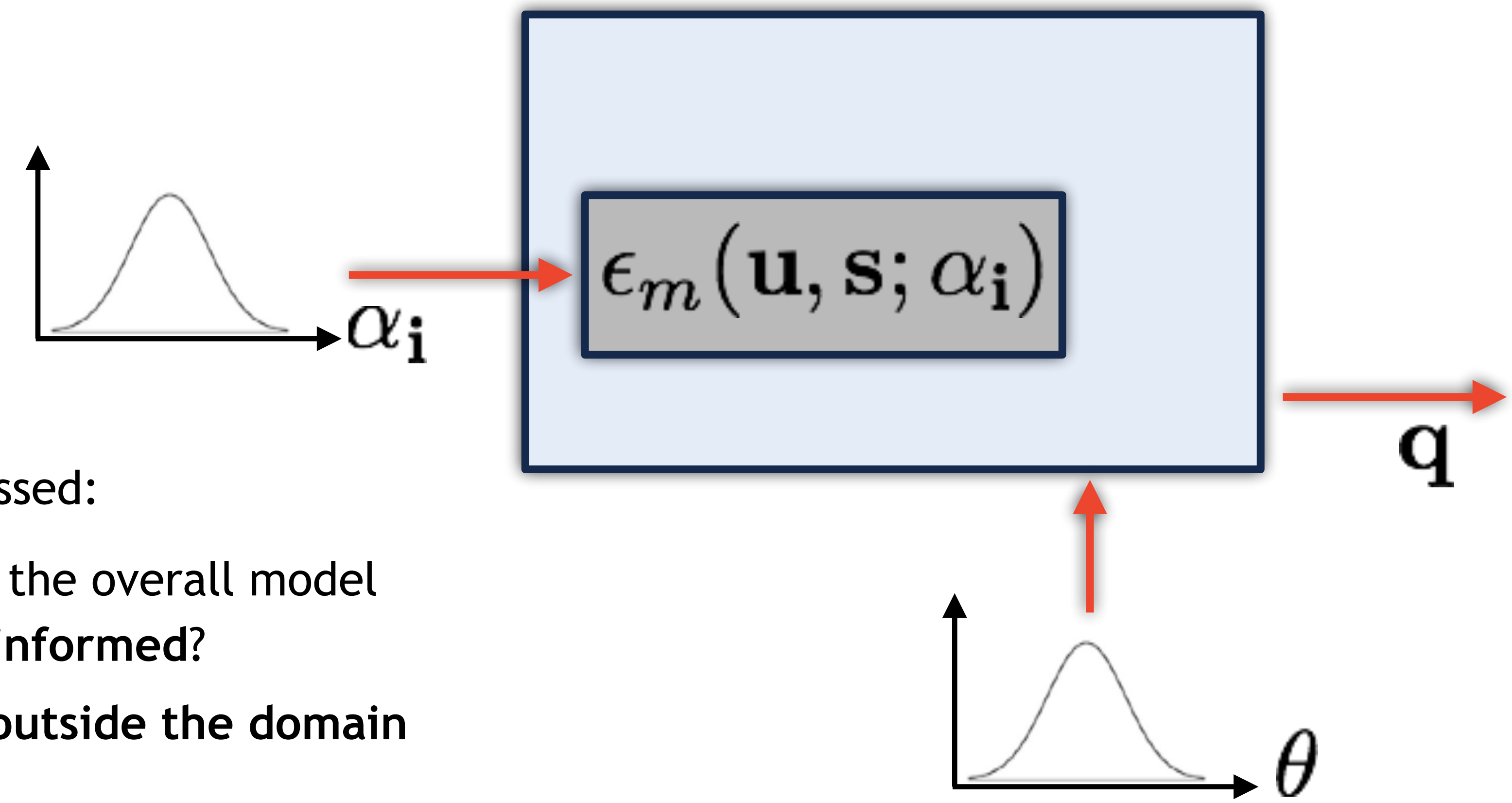
Last Class …

- **Calibration** or **Inverse Problem**
- **Validation**
- **Predictive Assessment**

Determines whether the calibration and validation phases were sufficiently informative and challenging to provide confidence in the reliability of the predictions of the QoIs.



Two primary questions need to be addressed:

- Are **QoIs sensitive to aspects** of the overall model that have **not been effectively informed**?
- Is the overall model being used **outside the domain of applicability**?

Moreover, is the prediction is determined to be credible, does it have **sufficiently small uncertainty** for our purposes?

Last Class …

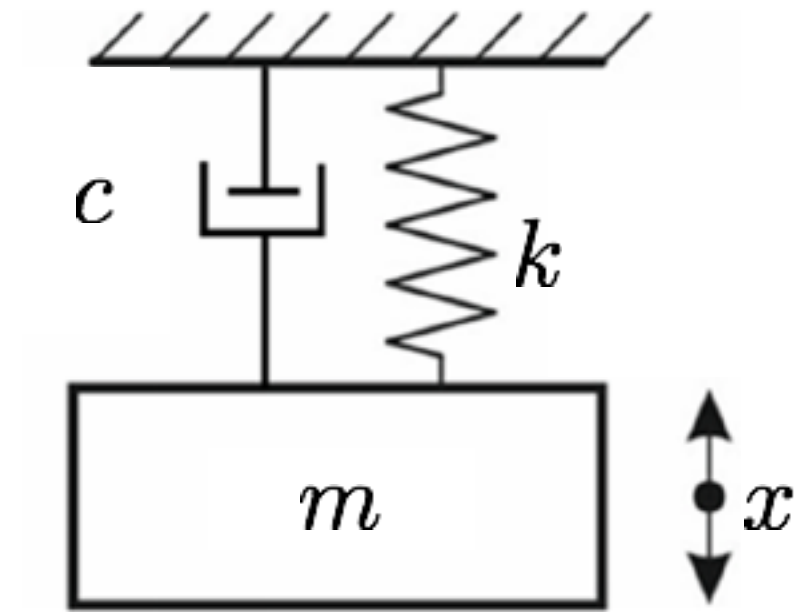
Example: Mass-Spring-Damper, Real World System

Reliable Physical Theory

$$\mathcal{R}(\mathbf{u}, \tau; \mathbf{r}) = \mathbf{0}$$

$$\boxed{m\ddot{x} + c\dot{x} + kx = 0}$$

$$\mathbf{u} = \begin{bmatrix} x \\ \dot{x} \end{bmatrix} \qquad \tau = \begin{bmatrix} c \\ k \end{bmatrix} \qquad \mathbf{r} = \begin{bmatrix} m \\ x(0) \\ \dot{x}(0) \end{bmatrix}$$



Real World Embedded Model

$$\tau = (\mathbf{u}, \mathbf{v}, \mathbf{s}, \theta)$$

$$k = \text{const}$$

$$c(T) = \exp\left(\frac{T_0}{T} - 1\right)$$

$$\dot{T} = c(T)\dot{x}^2 - \frac{T - T_0}{t_T}$$

$$\mathbf{v} = T \qquad \mathbf{s} = \begin{bmatrix} T_0 \\ t_T \end{bmatrix} \qquad \theta = k$$

$$\mathbf{y} = x$$

$$\mathbf{q} = \max(\dot{x})$$