Objectives:
1. Evaluate the mechanical linkages between FAM and AC mix by applying analytical upscaling methods with gross homogenization principles.
2. Prediction of sensitivity of FAM and AC aging ratios to a change in asphalt binder aging.

Introduction
Asphalt Concrete (AC) properties are strongly influenced by properties of the Fine Aggregate Matrix (FAM) which exists in between the aggregates in AC structure. It consists of fine aggregate particles, asphalt binder, and filler at a specific gradation.

Literature suggests that there is a strong link between these two materials, which means that proper tests on FAM can provide much needed insight in understanding the behaviors of AC and phenomena like healing moisture damage and aging etc.

Experimental Results

Fatigue Life

Damage Characteristic Curves and Model Fit
Damage characteristic curve (C-S) model fit equation
\[ C = 1 - \alpha S^b \]
\( a \) and \( b \) are model fit parameters

FAM Aging Experimental Results
FAM samples were tested at aging levels of 0, 7, 15 and 22 years at two air void levels.

Aging Sensitivity Study
\[ \frac{1}{G_{ct}} \frac{1}{G_{c0}} = kt \Rightarrow \text{Aging Parameter} \ = \ AP = kt \]
\( G_{ct}^* \) = Crossover modulus at un-aged case
\( G_{CT}^* \) = Crossover modulus at oxidation time in t years

\[
\text{Aging Ratio (AR)} = \frac{G_{ct}^*}{G_{c0}^*}
\]

Conclusions

With proper fabrication protocols FAM testing has potential for material characterization and ranking of mixtures.

The upscaling of AC modulus predictions showed an average of 10% difference with measured data.

Mechanical properties of FAM and AC are less sensitive to the chemical changes (during aging) in the asphalt binder.