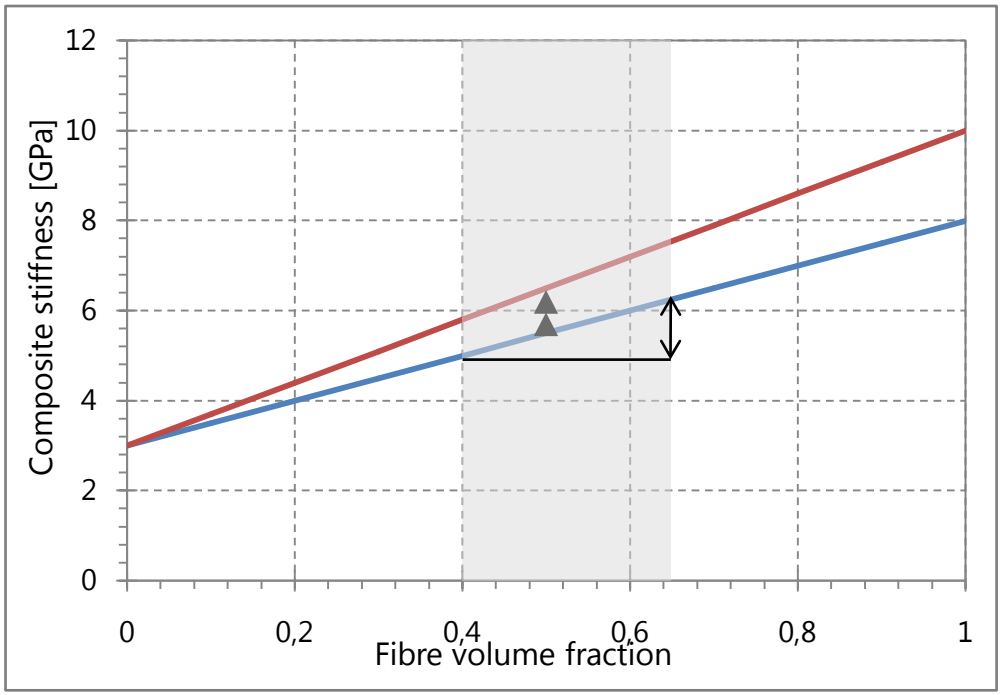
Composite manufacturing and modelling

Predicting the stiffness of unidirectional fibre composite

The stiffness of unidirectional fibre self-reinforced PLA composites is well predicted by a model based on a rule of mixture.

The model can be used to predict the stiffness of composites with different fibre volume fraction and different stiffness of reinforcement fibres. In the diagram:

- The blue and the red lines represent the stiffness of a composite calculated with a reinforcement fibre stiffness of 8 and 10 GPa respectively and a matrix stiffness of 3 GPa.
- The grey zone indicate a composite fibre volume fraction varying from 40 to 65 %
- The black triangle are the experimental data obtained for a 50% fibre volume fraction.



With the model it is possible to predict that by increasing the fibre volume fraction from 40 to 65%, the composite stiffness would increase by 1.6 GPa.

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