Wood-Concrete Sandwich Beam

StructOpt Project WS12/13

The Beam

Layers

1: Concrete (SCC)

2: Wood-Concrete (Velox)

3: Wood (CLT)



The Analogy

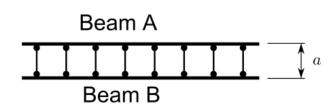
Layers

 $\begin{array}{c|cccc}
h_1 & & & & & \\
h_2 & & & & \\
h_3 & & & & & \\
\end{array}$ $\begin{array}{c|cccc}
& & & & \\
& & & \\
& & & \\
\end{array}$ $\begin{array}{c|cccc}
h_1/2 & & & \\
a & & & \\
& & & \\
\end{array}$ $\begin{array}{c|cccc}
h_1/2 & & & \\
a & & & \\
\end{array}$ $\begin{array}{c|ccccc}
h_3/2 & & & \\
\end{array}$

1: Concrete (SCC)

2: Wood-Concrete (Velox)

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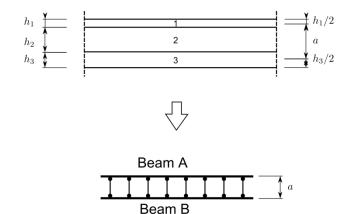


The Analogy

Beam A

$$EI_A = \sum E_i I_i$$

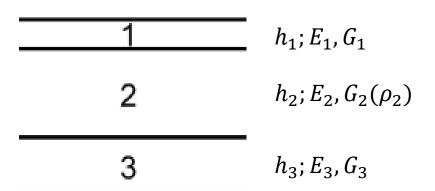
$$GA_A = \sum G_i A_i$$



Beam B

$$EI_B = \sum z_{s,i} E_i A_i$$

$$GA_B = S(c_i, G_i, a)$$



The Analogy

Objective function $weight(h_2, h_3, [\rho_2])$

Constraints

$$w_{x=l/2} \le \frac{l}{400}$$

 $h_1; E_1, G_1$ $h_2; E_2, G_2(\rho_2)$ $h_3; E_3, G_3$

Goal: optimal dimensions and minimum weight