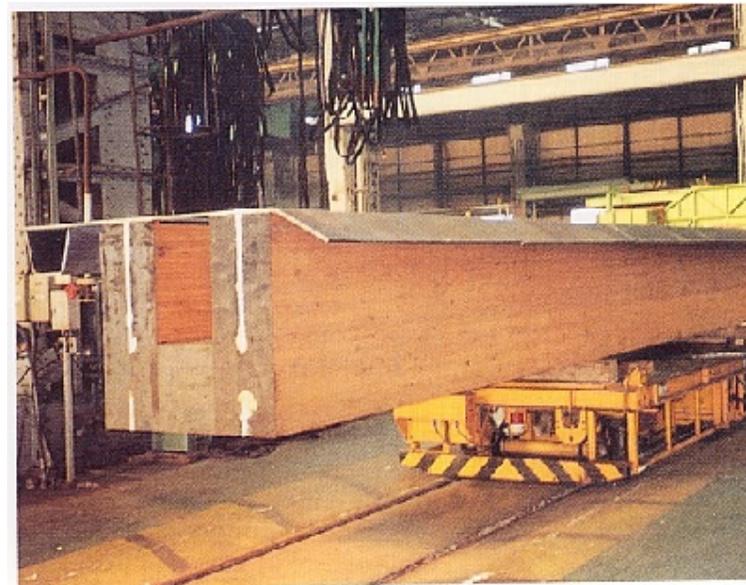
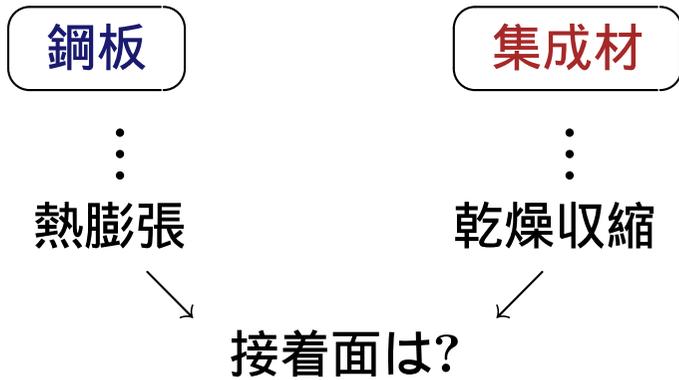


乾燥収縮を受ける鋼板挿入集成材梁の有限要素解析

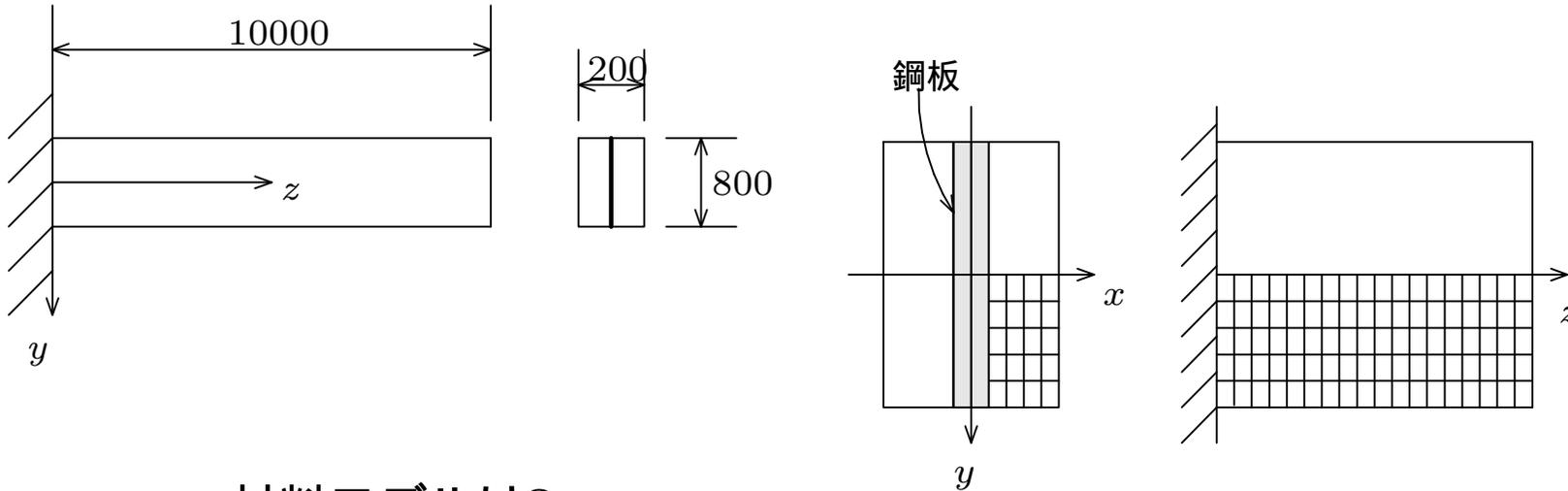
00485 松熊千史

集成材梁 → ハイブリット長スパン化



実験するのは大変! → コンピューターの中で解析

解析方法は ... → 直方体要素 FEM



材料モデルは?

⋮

鋼：等方性材料 (E, G)

集成材：直交異方性 $\left[\begin{array}{l} E_x, E_y, E_z \\ \nu_{xy}, \nu_{xz}, \nu_{yz} \\ G_{xy}, G_{xz}, G_{yz} \end{array} \right]$

熱ひずみ 含水ひずみ

⋮

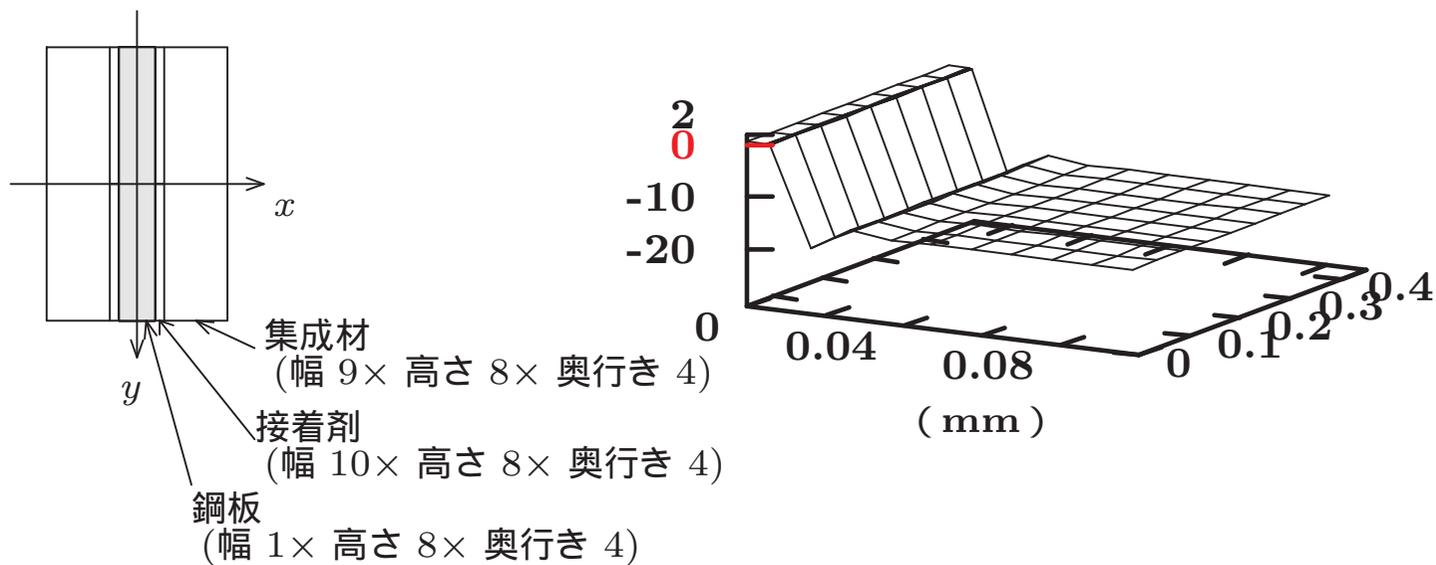
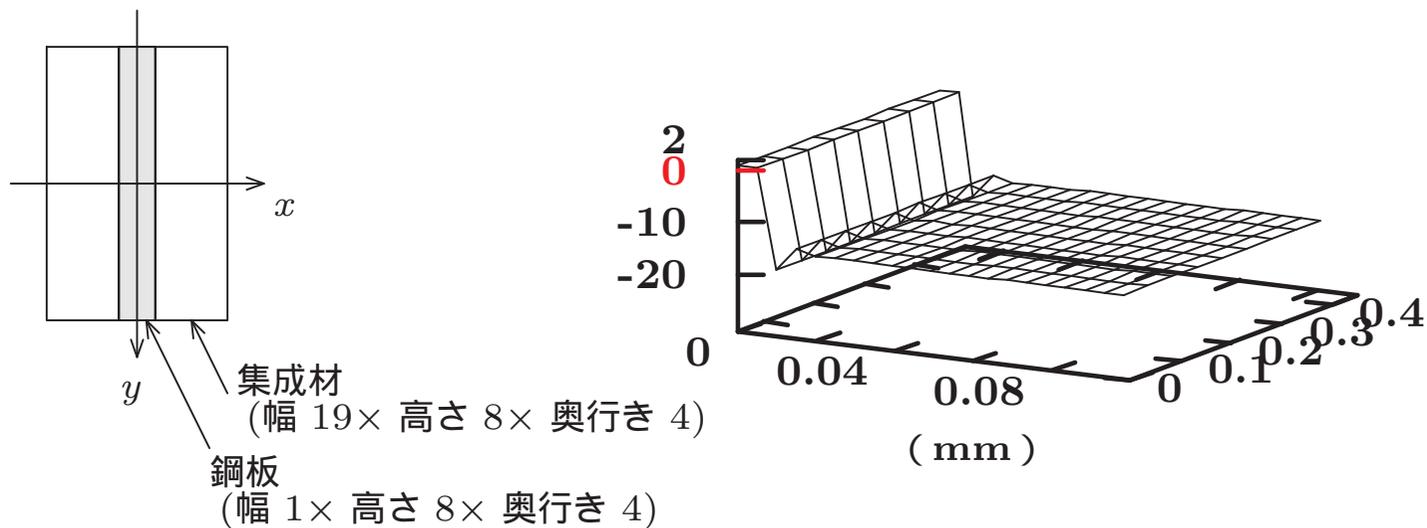
⋮

$$\varepsilon_i = \alpha_i \Delta T + \beta_i \Delta H$$

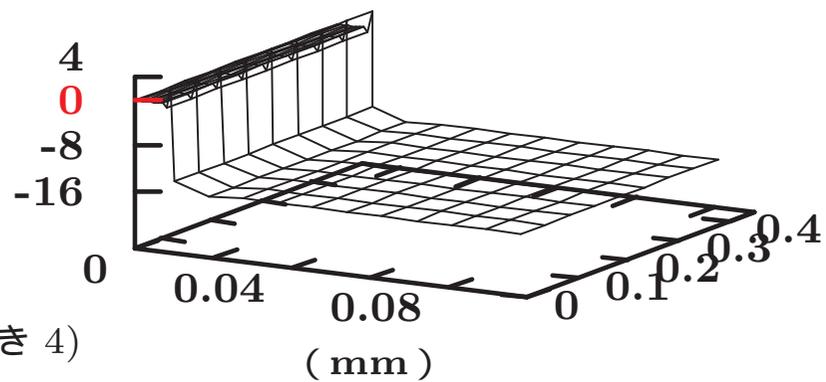
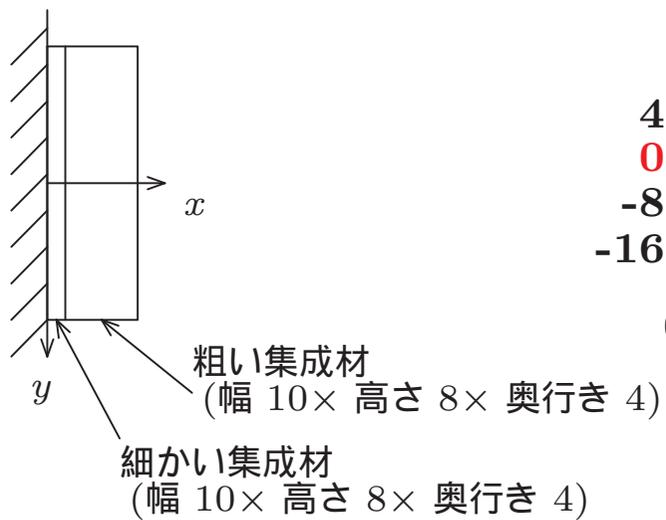
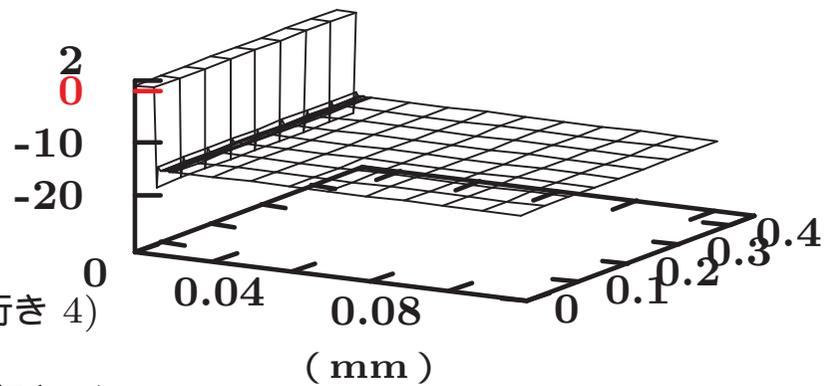
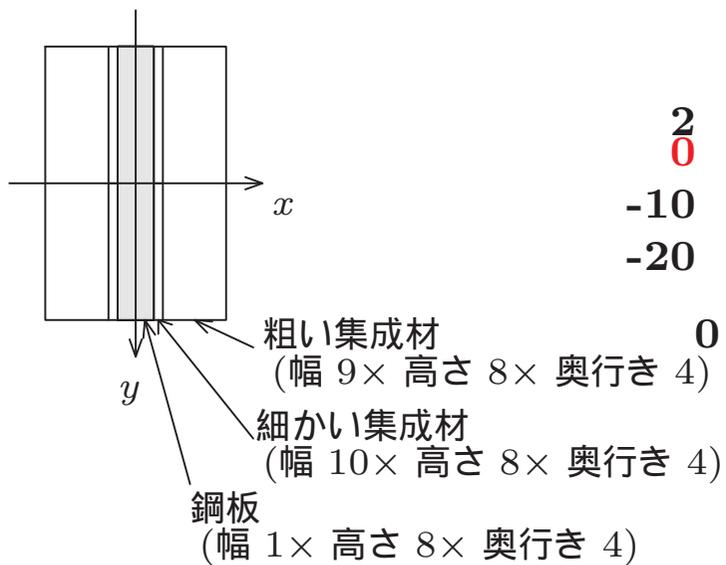
↑ ↑ ↑ ↓
 係数 温度変化 係数 含水率変化

端部変位

(温度変化: $+10^{\circ}\text{C}$, 含水率変化: -10%)



端部変位



まとめ

鋼板

集成材

⋮

⋮

熱膨張 ($\alpha_i \Delta T$)

乾燥収縮 ($\beta_i \Delta H$)

直方体要素 FEM

鋼材 + 集成材

鋼材 + 接着剤 + 集成材

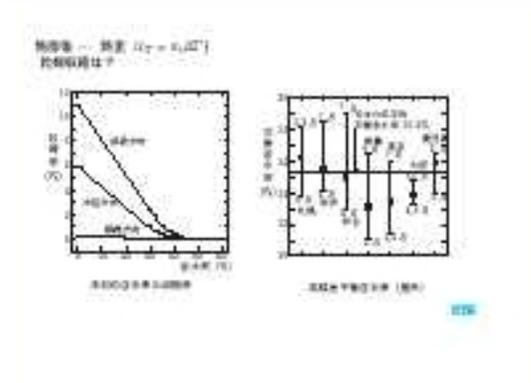
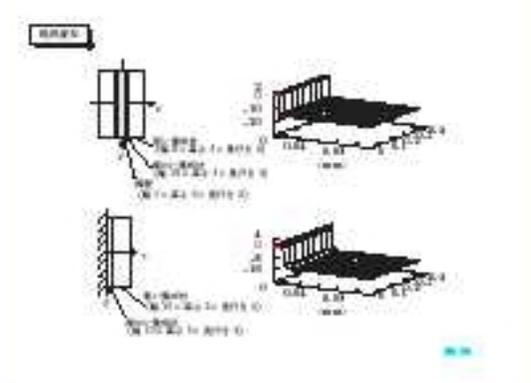
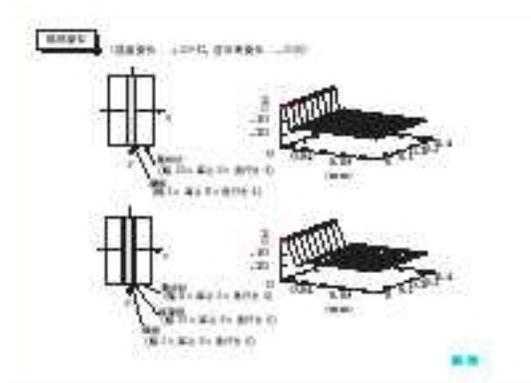
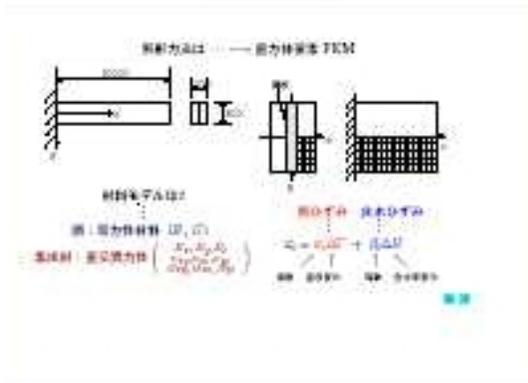
鋼材 + 集成材 + 集成材

集成材 + 集成材

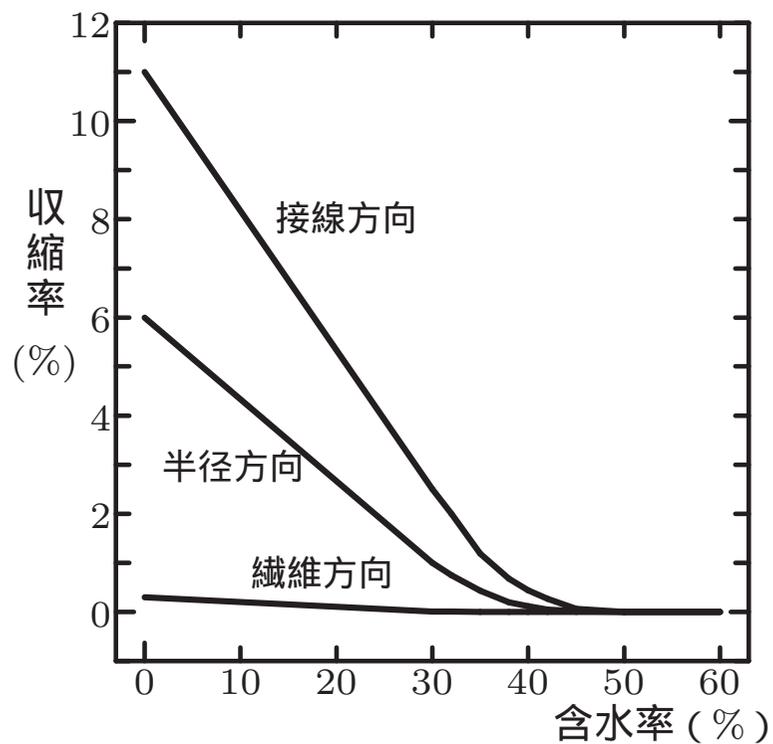
⋮

特定の要素に変形がたよる

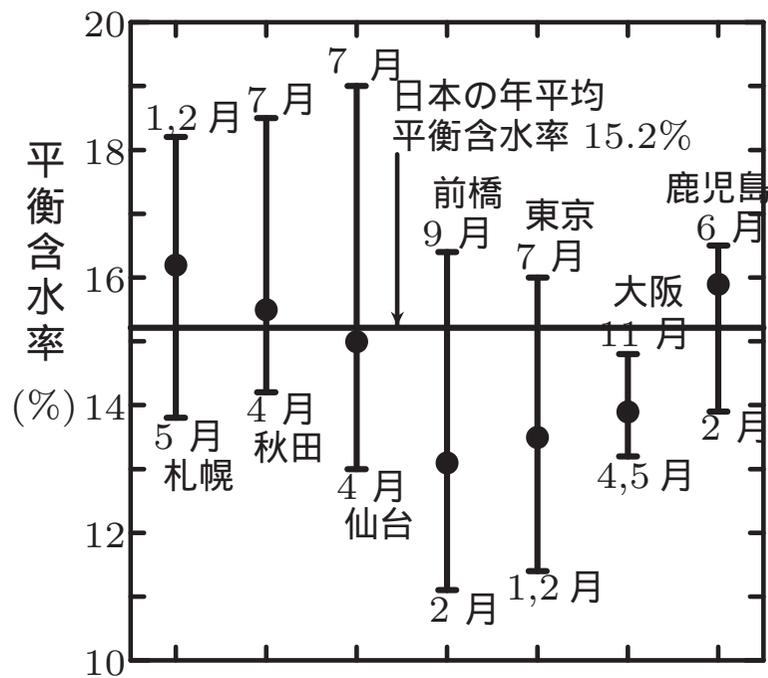
目次



熱膨張 … 熱歪 ($\varepsilon_T = \alpha_i \Delta T$)
 乾燥収縮は？



木材の含水率と収縮率



気候地平衡含水率 (屋外)