

A short course on

Structural Members

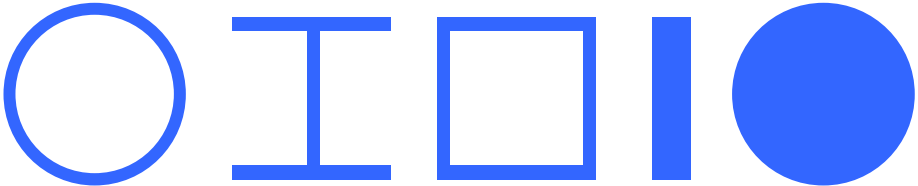
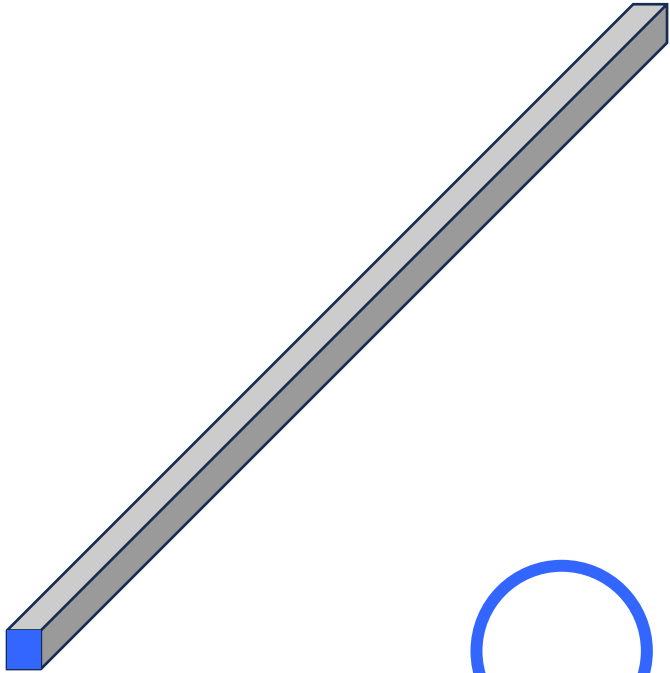
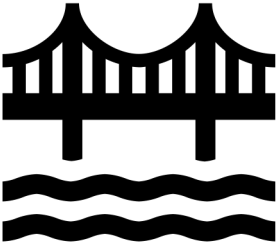
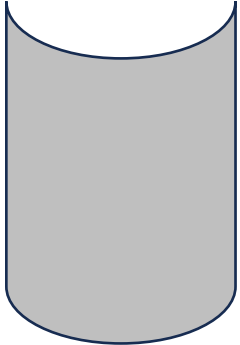
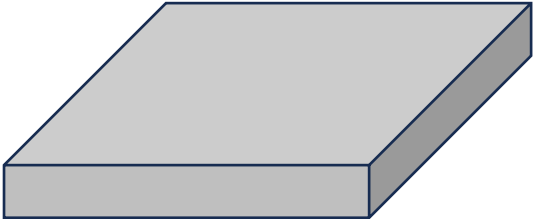
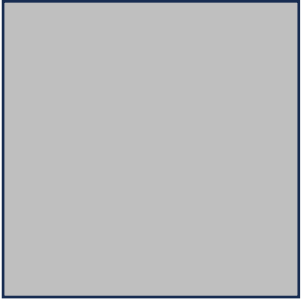
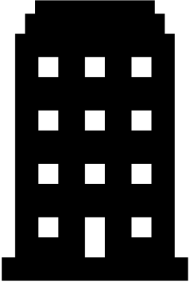
This video:

Structural Boundary Value Problems

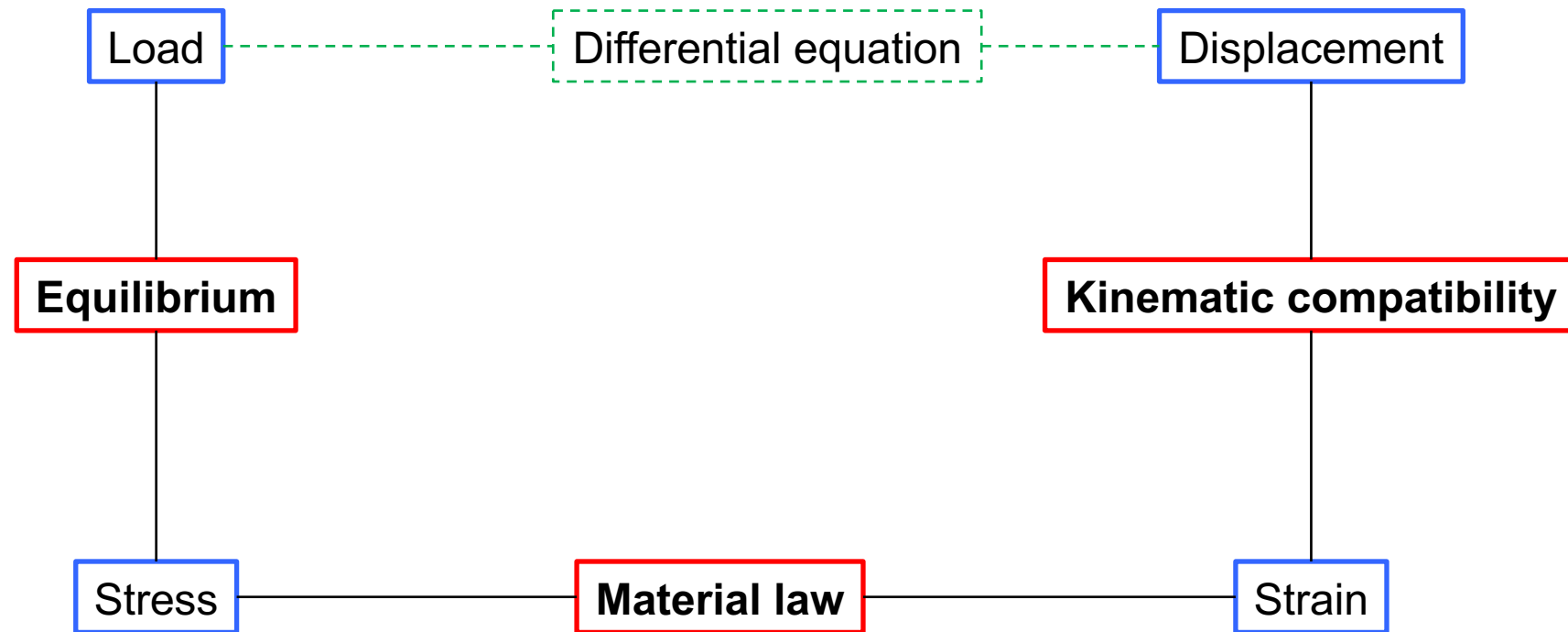
Terje's Toolbox is freely available at terje.civil.ubc.ca

It is created and maintained by Professor Terje Haukaas, Ph.D., P.Eng.,
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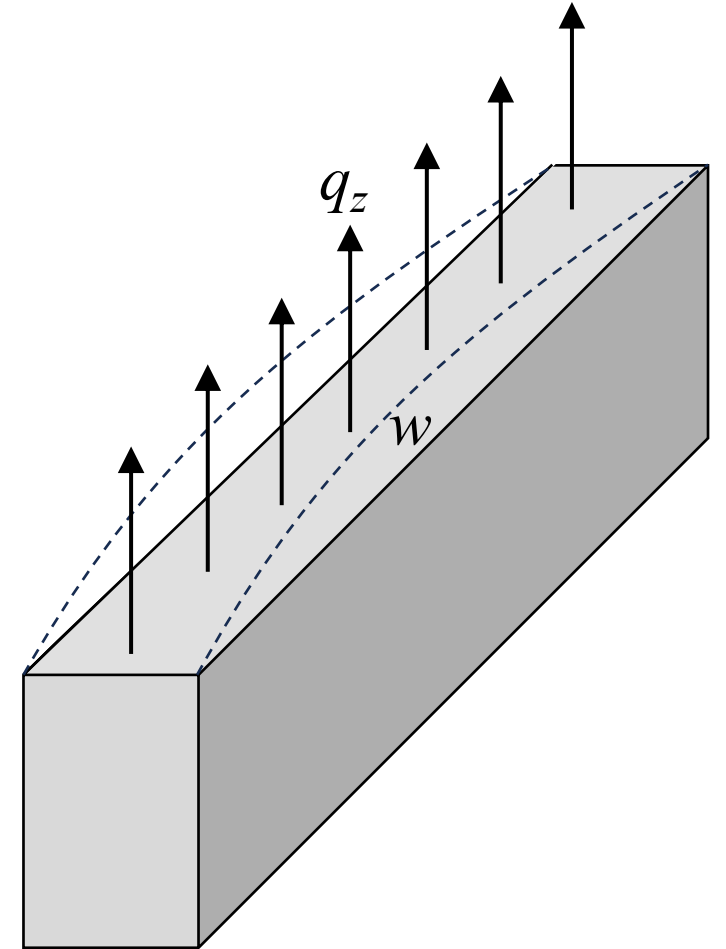
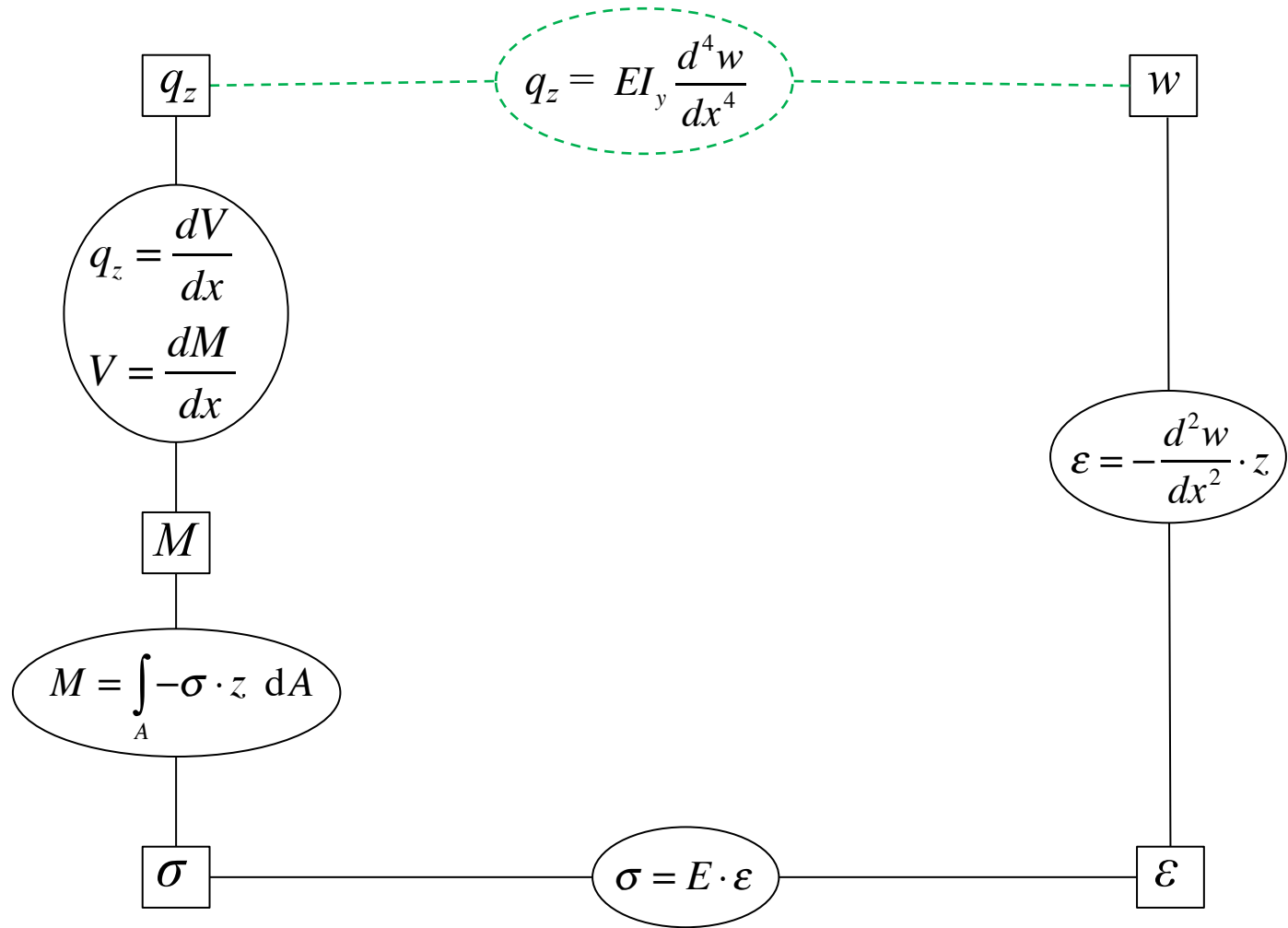
Structural Members



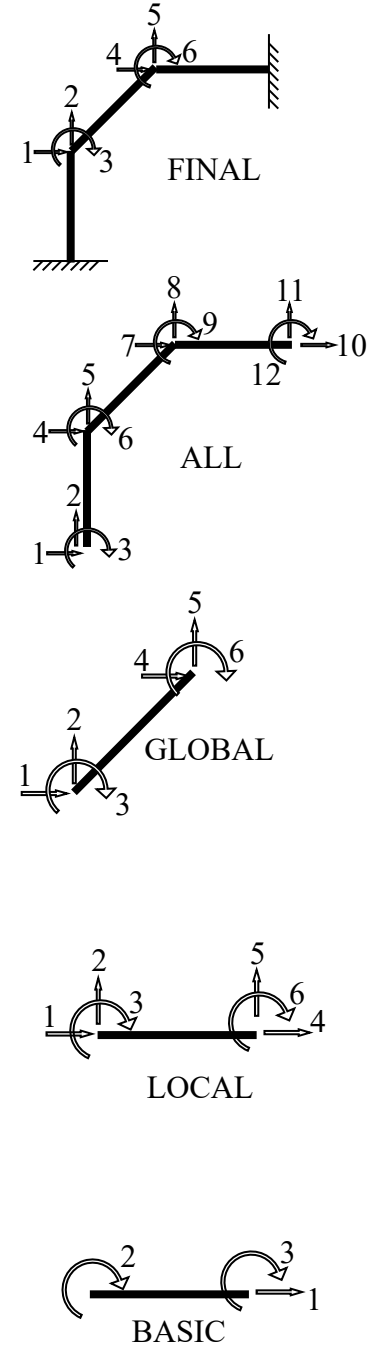
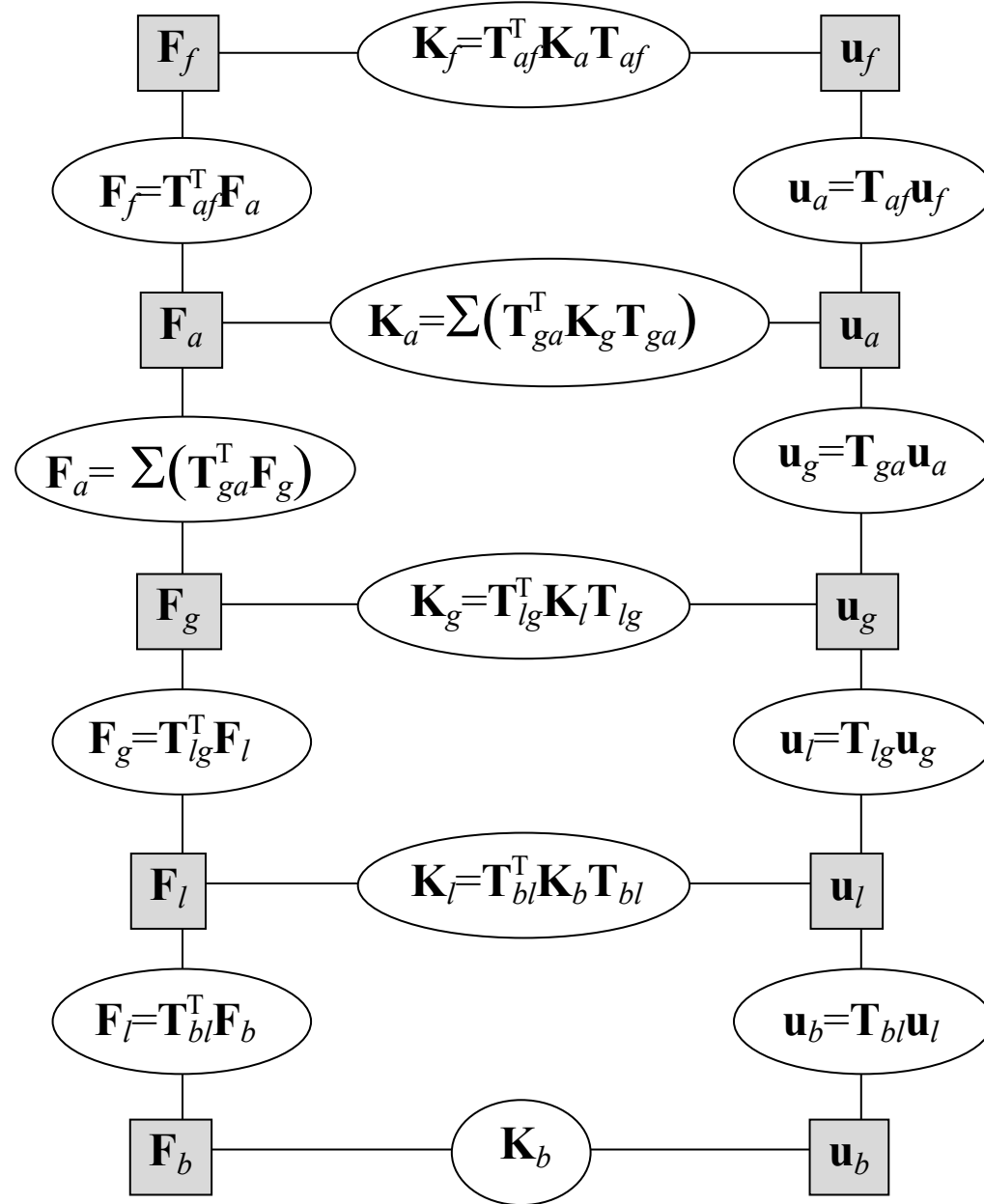
Ingredients of the BVP



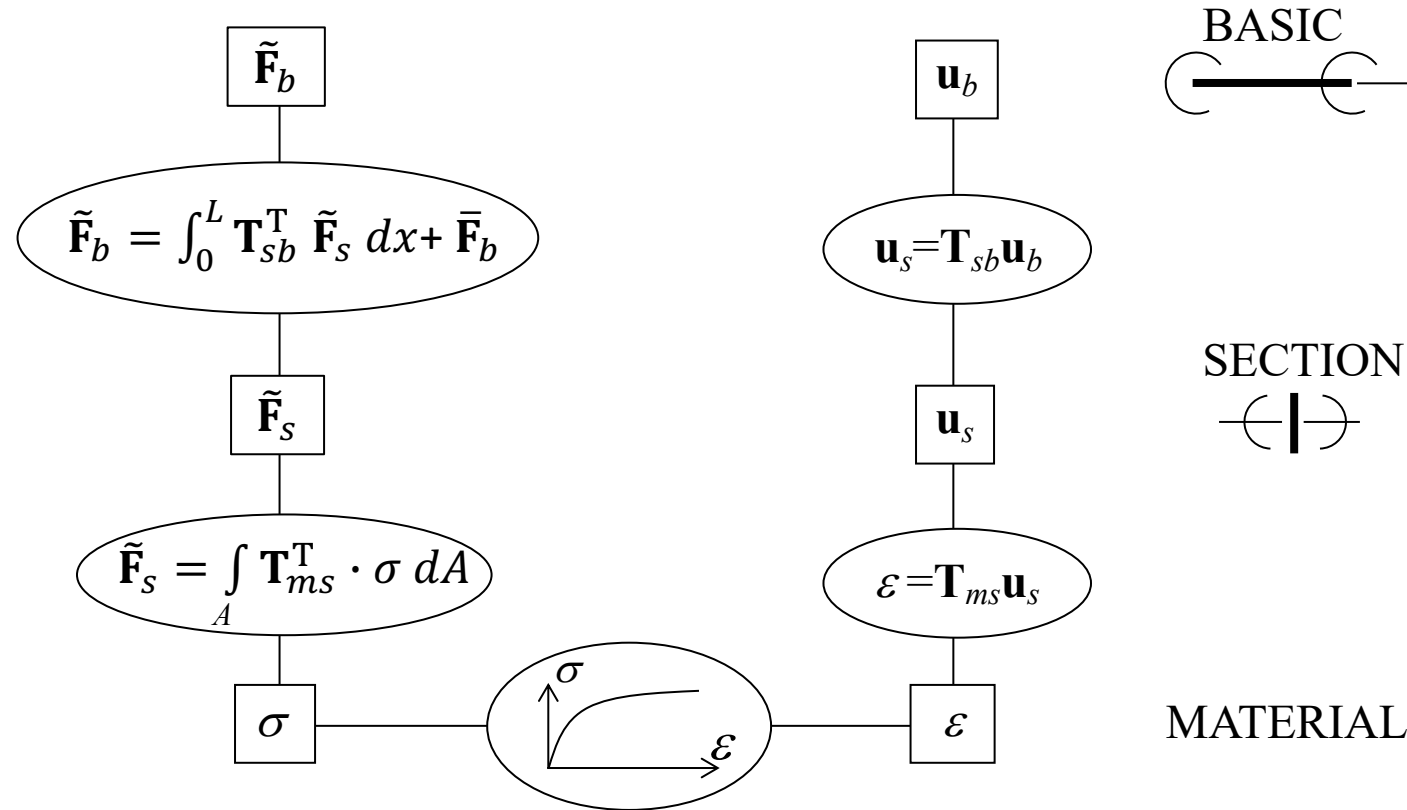
Beam Bending



Matrix Structural Analysis



Nonlinear Analysis



Forms of the BVP

Strong form (differential equation):

$$EI \cdot w'''' - q = 0$$

Weight and integrate



Require point-wise fulfilment



Weighted residual form:

$$\int_0^L (EI \cdot w'''' - q) \cdot \delta w \cdot dx = 0$$

Integration by parts



Integration by parts



Weak form (virtual work):

$$\int_0^L EI \cdot w'' \delta w'' dx = \int_0^L q \cdot \delta w dx$$

Anti-variation



Variation



Variational form (energy):

$$\int_0^L \frac{1}{2} \cdot EI \cdot (w'')^2 dx = \int_0^L q \cdot w dx$$

More lectures:

Terje's Toolbox:

terje.civil.ubc.ca