

A short course on

Indeterminate Structures

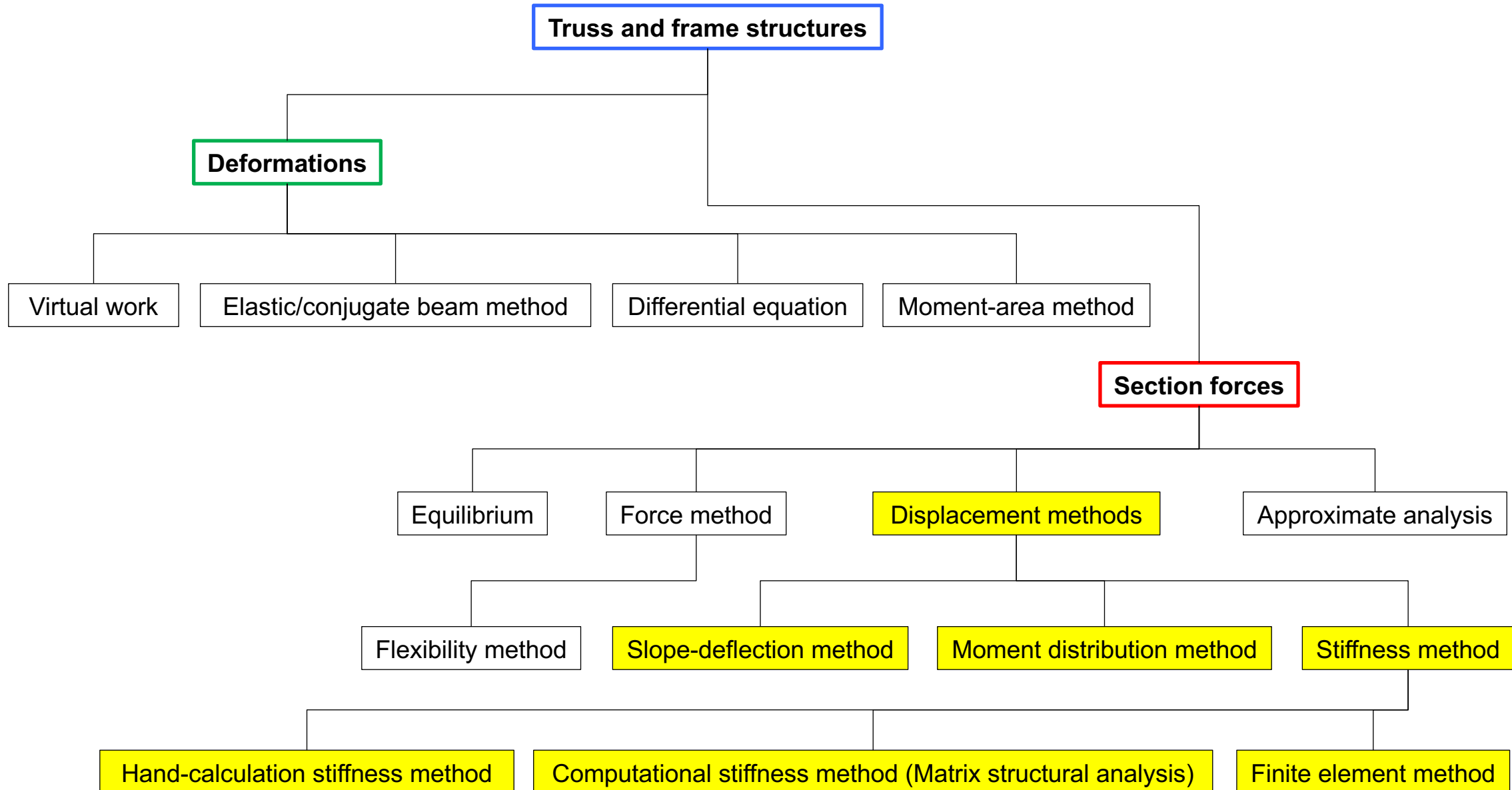
This video:

Degrees of Freedom

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

It is created and maintained by Professor Terje Haukaas, Ph.D., P.Eng.,
Department of Civil Engineering, The University of British Columbia (UBC), Vancouver, Canada

Overview of Methods



Two Worlds

Number of unknowns in displacement methods

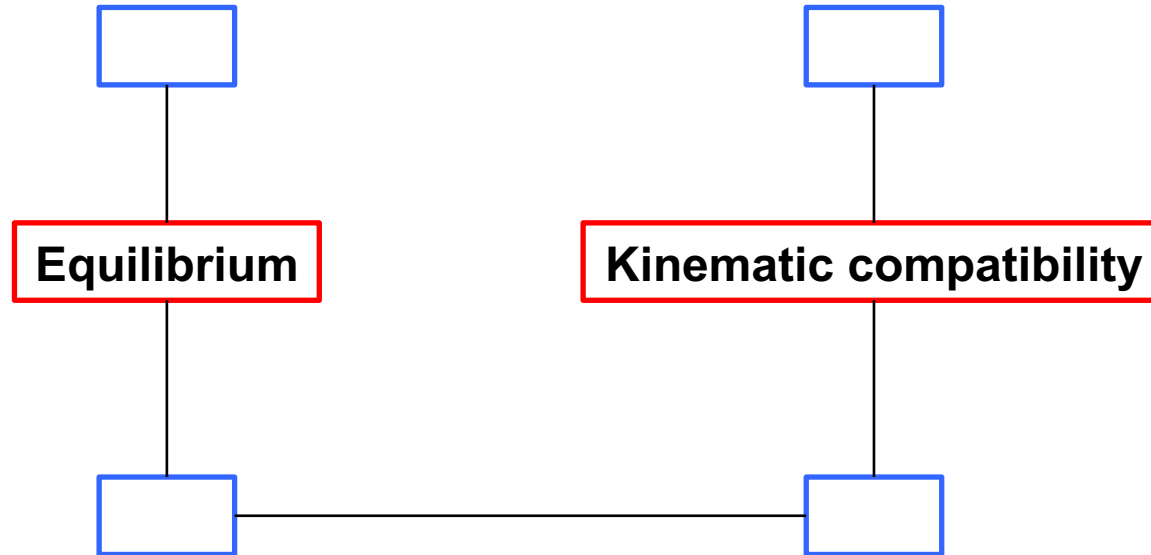


DKI
(Degrees of freedom)

Number of unknowns in force methods



DSI
(Redundants)



Procedures

Displacement Methods

Number of unknowns: DKI

Name of unknowns: Degrees of freedom (DOFs)

Governing equations: Equilibrium

Get BMD from: End moments

Force Method

Number of unknowns: DSI

Name of unknowns: Redundants

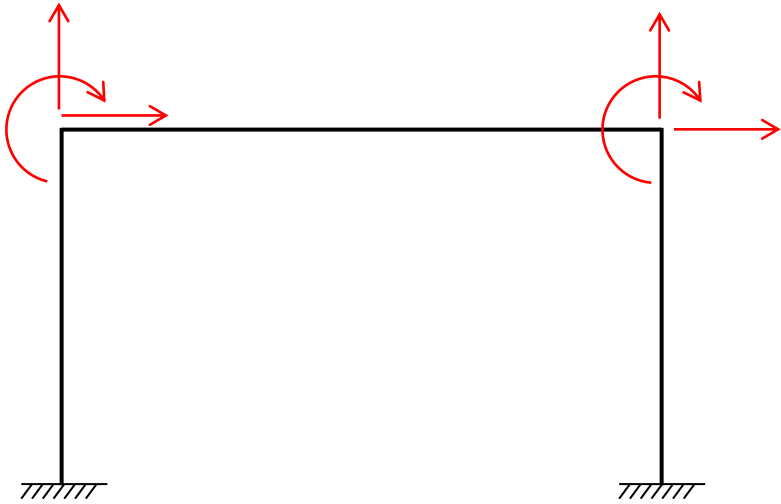
Governing equations: Compatibility

Get BMD from $M = M_0 + M_B * X_B$

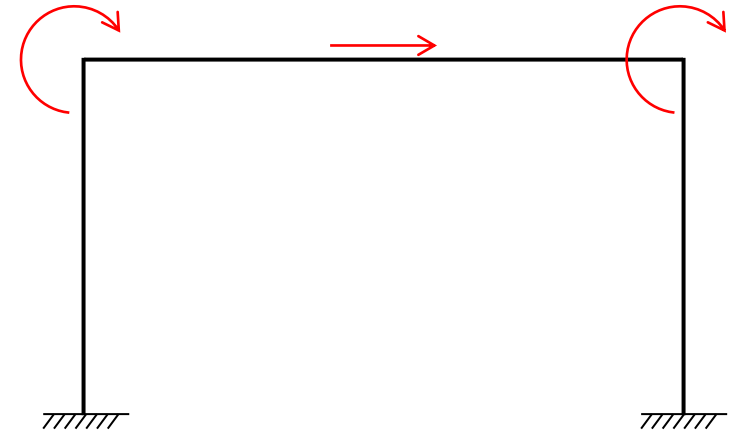
DKI & DOFs

DKI = number of unknown displacements and rotations = number of degrees of freedom

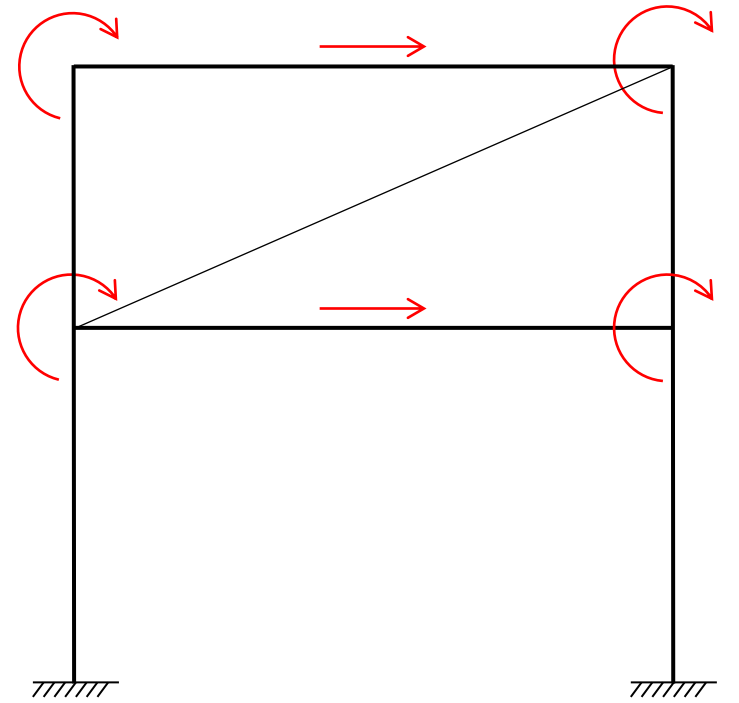
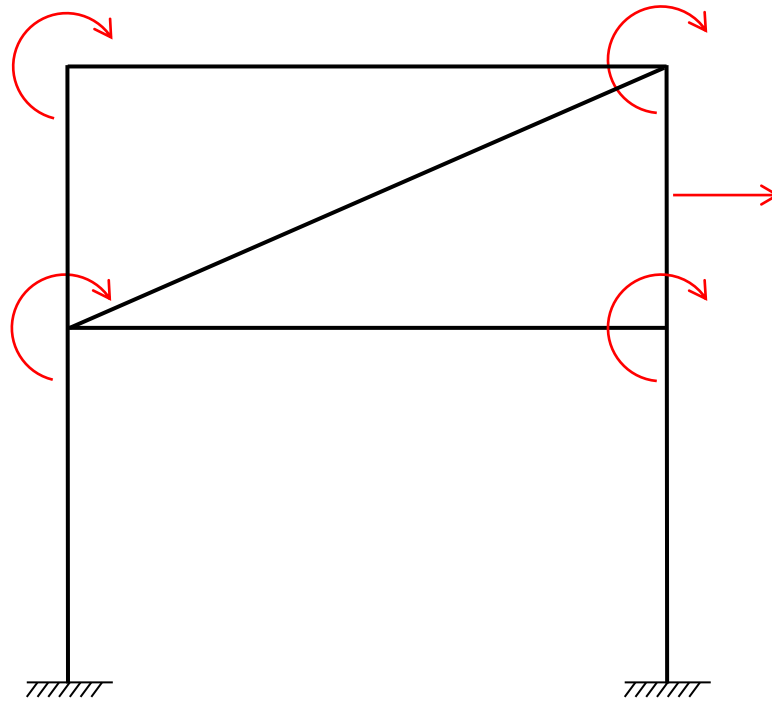
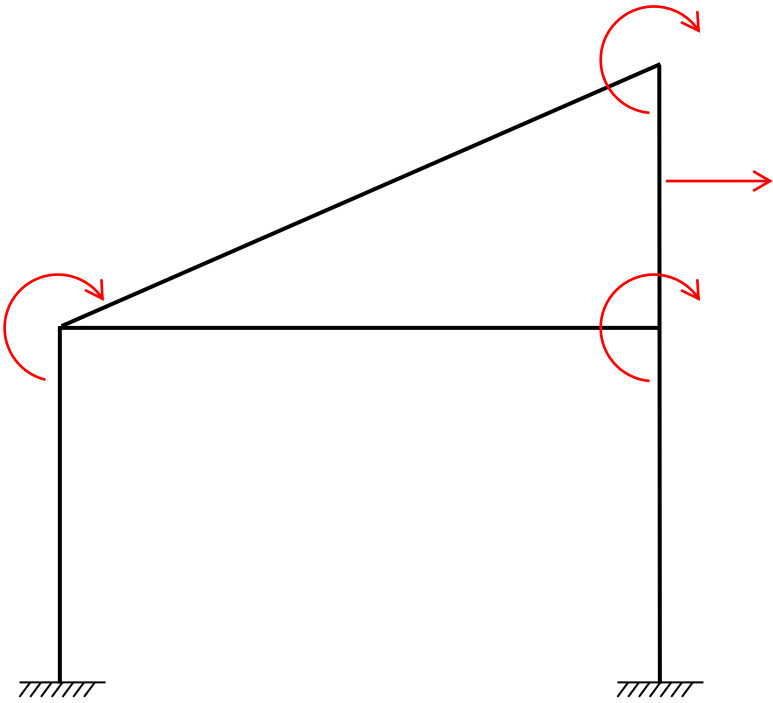
Include axial deformations
(computer analysis)



Neglect axial deformations
(hand calculations)

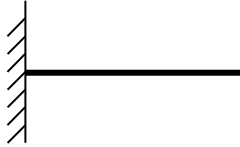


Bracing



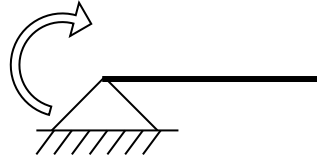
Support Types

Fixed:



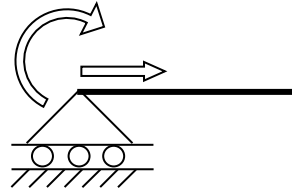
No DOFs

Pinned:



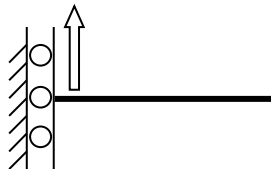
1 DOF

Roller:



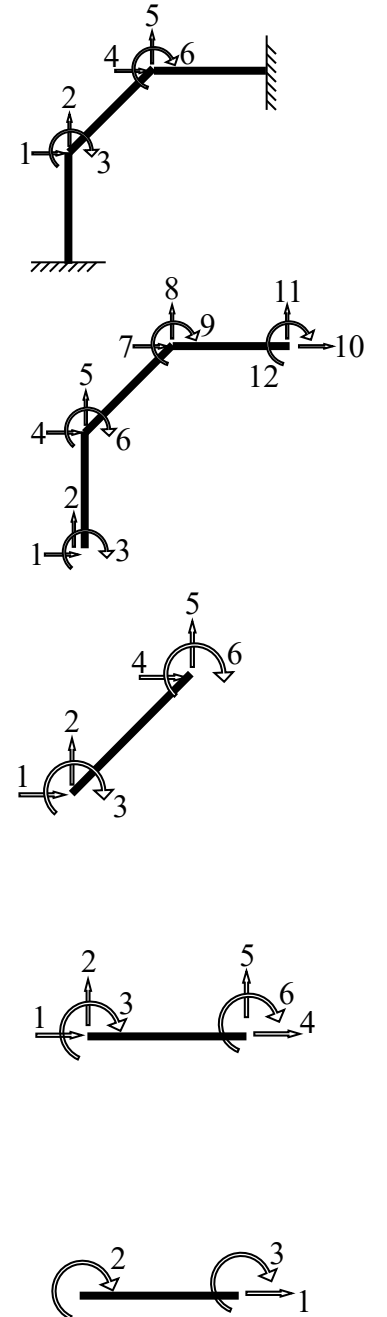
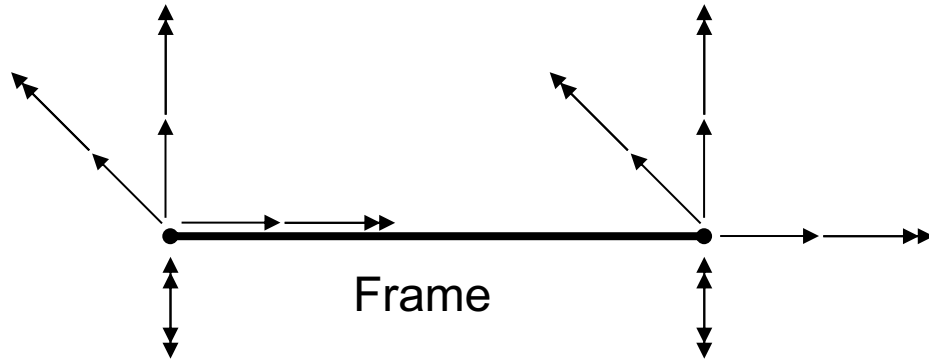
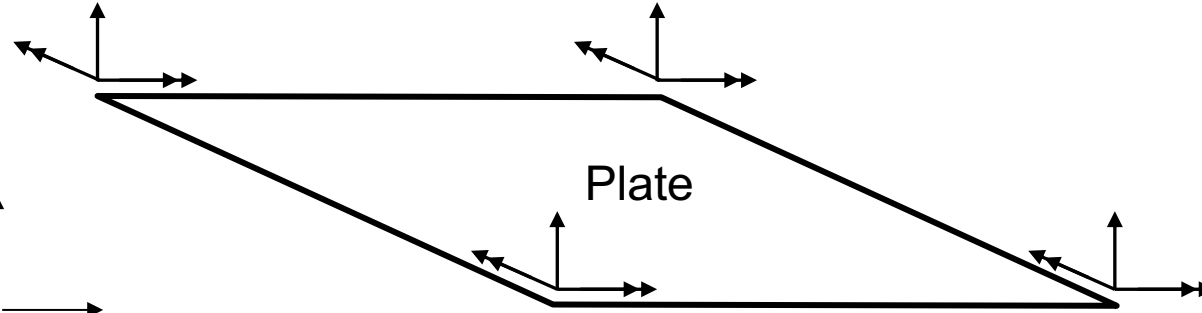
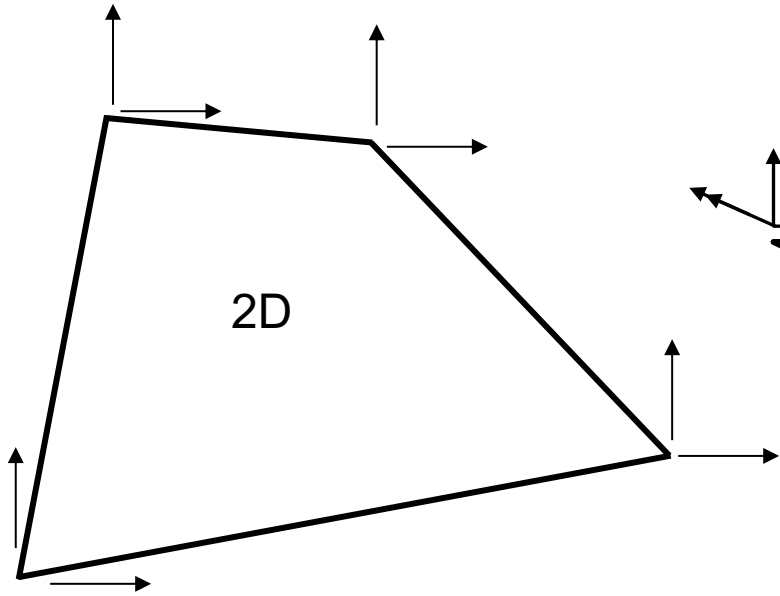
2 DOFs

Slider:



1 DOF

Element Vs. Structural DOFs



More lectures:

Terje's Toolbox:

terje.civil.ubc.ca