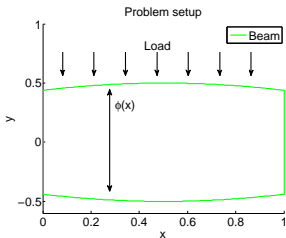


- Language: MATLAB (**M**atrix **L**aboratory)
  - *Interpreted, object-oriented, with weakly dynamic* type system
  - Wealth of high-level functions and *toolboxes*
  - Used for rapid prototyping, data postprocessing, visualization, and teaching in numerical and engineering applications
- Transformation: ADiMat (**A**utomatic **D**ifferentiation for **M**atlab)
  - Source-2-source code transformation tool for Matlab
  - Goal: Compute derivatives of Matlab functions
- Implementation
  - Bison/Flex parser for Matlab creates AST in form of XML document
  - Syntax tree is transformed and unparsed with XSLT



Example: <http://www.it.uu.se/grad/courses/optforDE/>

- 1D Finite Element simulation of a uniformly loaded simply supported beam
- Optimize shape  $\phi$  for stiffness under weight constraint
- Cost function  $J(\phi)$ , implemented in function `fun`
- Derivative  $\frac{dJ}{d\phi}$ :  
`admDiff(@fun, 1, phi)`

