

2015/03/27

Friday, March 27, 2015
11:40 AM

Windows: Visual C++ in Visual Studio is used:

<https://www.visualstudio.com/en-us/products/visual-studio-express-vs.aspx>

Mac Linux

<https://eclipse.org/downloads/packages/eclipse-ide-cc-developers/keplersr2>

Or use make file approach -> debugging will be command line with gdb

*.sln is the file that we open with VC++
Solution has several projects in it.

Header files:

Header files: *.h files :have declaration of functions and sometimes (global) variables

Source files: *.cpp, *.cxx files: Have definitions of the functions and variables.

The main function of the solution is always called main and return 0

```
int main()
```

```
K
rows 2 cols 2
1 2
3 1
```

F (RHS) is

```
size 2 4 7
```

a (LHS unknown) is

```
size 2 2 1
```

Press any key to continue . . .

```
int singular = LUsolve(K, a);
```

Linear solver

$Kx = a$ $x \rightarrow a$ stored back to a .

Calculating Element Stiffness matrix

bar $k = \frac{AE}{L} \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ k_b

truss $k = \frac{AE}{L} \begin{bmatrix} c^2 & +cs & -12b \\ cs & s^2 & -6b \\ \hline -6b & 6b & kb \end{bmatrix}$

,
,
,

bar A, E, L

truss ν, c, s

k Calculate Element Stiffness (Element properties, type)

{ if (type == 0) // bar Element

$$k = \frac{AE}{L} \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix};$$

return

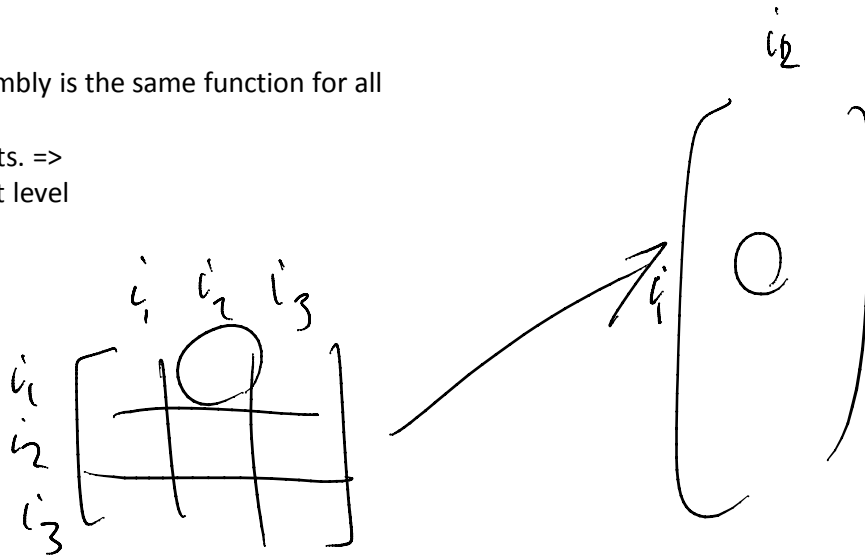
if (type == 1)

$$k = \underline{\hspace{2cm}}$$

}

Unlike ComputeStiffness matrix Assembly is the same function for all the elements =>

- A general function for all elements. =>
- Implementation is at the element level



Sample virtual functions at the element level:

```
virtual void setGeometry() = 0;  
virtual void setInternalMaterialProperties(PhyMaterial* pMat) = 0;  
virtual void Calculate_ElementStiffness_Force() = 0;
```