The finite element method begins by dividing all of space up into "finite elements". The unknown value (let's say it's voltage for our application) is given a "shape function" and is defined on each element. The value for each element is zero outside of the element. This is much like a basis function in Method of Moments. The total voltage distribution is now defined as a sum of voltages on each finite element:



Here are some common finite elements:

    

 

  

 

 = 0 outside element = 0 outside element



  constant

Therefore, the potential V varies linearly within element.

The Electric Field **E** is constant within element.

GOVERNING EQUATIONS (“STIFFNESS MATRIX”)







 







The elemental shape functions are:





ELEMENT SHAPE 

 are linearly interpolating functions between the nodes.





# ENERGY

The energy per unit length of the element is



  Because 2D



















 



THIS is the COEFFICIENT MATRIX Cij Coupling between modes i, j

STIFFNESS MATRIX



Elemental energy



# Assemble Elements

Total Energy (Global) 



 4

2 5

 1 3





 

 





