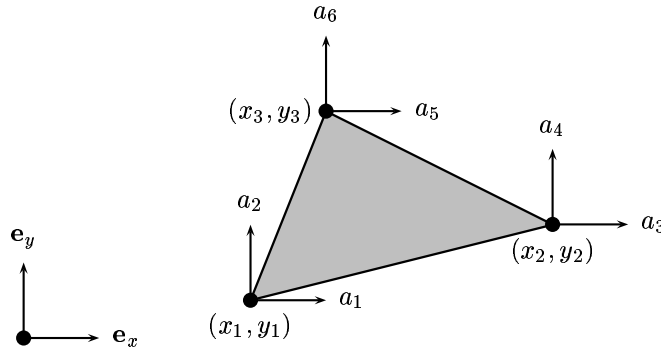


**Purpose:**

Compute the element stiffness matrix for a triangular 3 node large deformation element in plane strain.

**Syntax:**

`Ke=plan3ge(ec,t,D,ed,es)`

**Description:**

`plan3ge` provides the element stiffness matrix  $\mathbf{K}_e$  for a triangular 3 node large deformation element in plane strain or plane stress. The element nodal coordinates  $x_1, y_1, x_2$  etc. in the undeformed configuration are supplied to the function by `ec`

$$\mathbf{ec} = \begin{bmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_3 \end{bmatrix}$$

The element thickness  $t$  is supplied by `t`, `ed` contain the current element displacement vector obtained by the function `extract` and `es` the second Piola-Kirchhoff stress tensor.

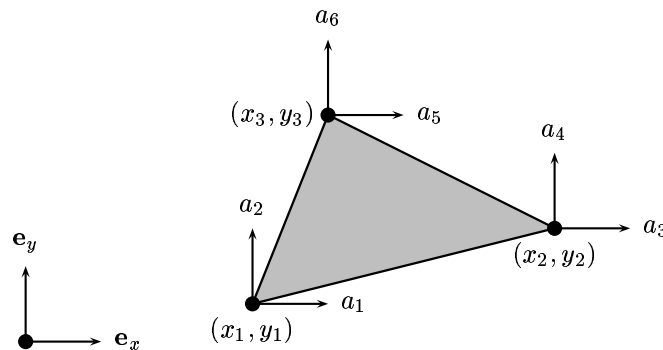
$$\mathbf{ed} = \mathbf{a}^{eT} = [a_1 \ a_2 \ \dots \ a_6] \quad \mathbf{es} = \mathbf{S} = \begin{bmatrix} S_{11} \\ S_{22} \\ S_{12} \end{bmatrix}$$

The material properties are supplied by the constitutive matrix  $\mathbf{D}$  of type  $(3 \times 3)$  can be used.

$$\mathbf{D} = \mathbf{D} = \begin{bmatrix} D_{11} & D_{12} & D_{13} \\ D_{21} & D_{22} & D_{23} \\ D_{31} & D_{32} & D_{33} \end{bmatrix}$$

**Purpose:**

Compute strains and deformation gradient in a triangular 3 node large deformation element.

**Syntax:**

`[ee,eff]=plan3gs(ec,ed)`

**Description:**

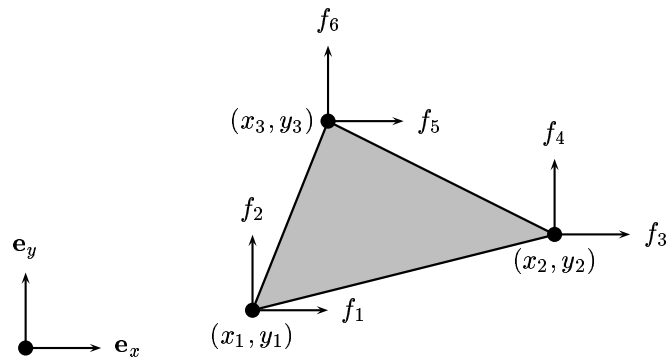
plan3gs computes the Green-Lagrange strains and the deformation gradient

$$ee = \mathbf{E} = \begin{bmatrix} E_{xx} \\ E_{yy} \\ 2E_{xy} \end{bmatrix} \quad eff = \mathbf{F} = \begin{bmatrix} \frac{\partial x}{\partial x^o} \\ \frac{\partial x}{\partial y^o} \\ \frac{\partial y}{\partial x^o} \\ \frac{\partial y}{\partial y^o} \end{bmatrix}$$

The input variables ec and ed are defined in plan3ge.

**Purpose:**

Compute internal element force vector in a triangular 3 node large deformation element in plane strain.

**Syntax:**

```
ef=plan3gf(ec,t,ed,es)
```

**Description:**

plan3gf computes the internal element forces vector

$$\mathbf{ef} = \mathbf{F}_{\text{int}}^T = [f_1 \ f_2 \ \dots \ f_6]$$

The input variables `ec`, `t`, `es` and `ed` are defined in `plan3ge`. To form the global internal force vector use can be made of `insert`.