

1.

A fibre is marked on two sides with small dots. The position of these dots is measured in an unloaded reference configuration. From these measurements it appears that the positions are given as

$$\vec{x}_{0,A} = -\vec{e}_x + 3\vec{e}_y$$

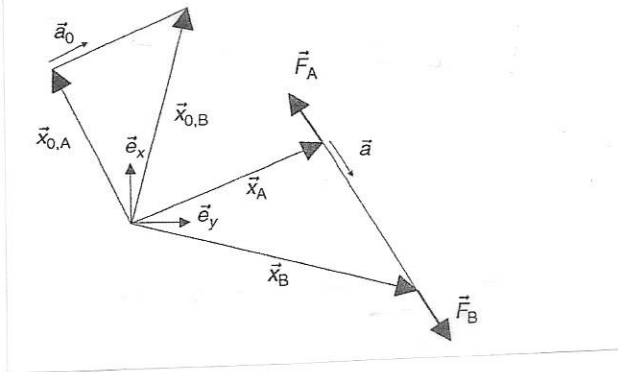
$$\vec{x}_{0,B} = 2\vec{e}_x + 3\vec{e}_y.$$

The fibre moves and in the current (deformed) configuration the positions of points A and B are measured again:

$$\vec{x}_A = 4\vec{e}_x + 2\vec{e}_y$$

$$\vec{x}_B = 8\vec{e}_x - \vec{e}_y.$$

The constant in the force versus extension relation is $c = 300$ [N]. Determine the force vectors $\vec{F}_A$ and $\vec{F}_B$ in the deformed configuration.



2.

In the situation that is depicted in the drawing below only the gluteus medius is active. During adduction of the bone the femur rotates. The point of application of this muscle on the trochanter B follows a circular path. The point of application on the acetabulum A is given by the vector $\vec{x}_A = L\vec{e}_y$. When the adduction angle $\phi = 0$ the length of the muscle is $\ell = \ell_c$. Calculate the force $\vec{F}$ as a function of the adduction angle ϕ .

