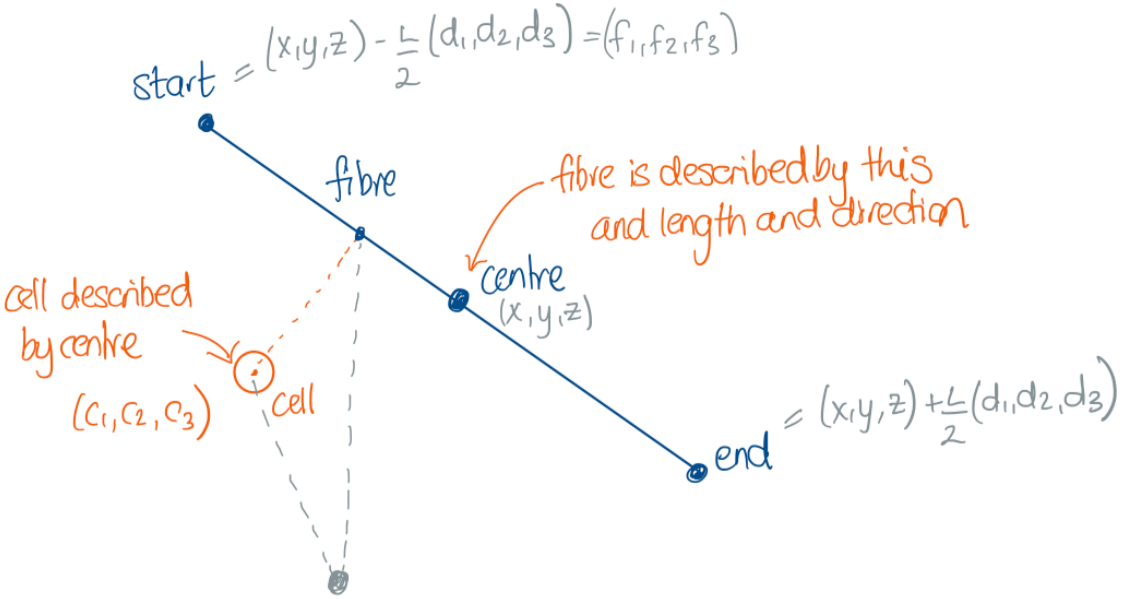
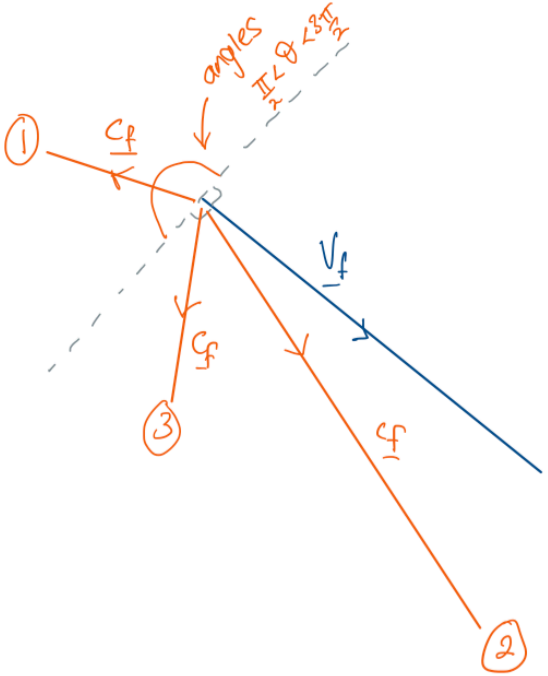
Cell-fibre distance determination

Monday, 11 October 2021 19:05





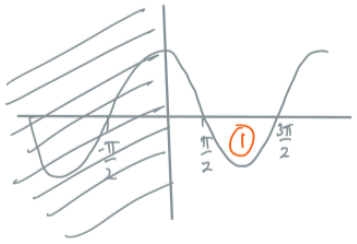
① $\underline{c}_f$ forms an obtuse angle with $\underline{v}_f$

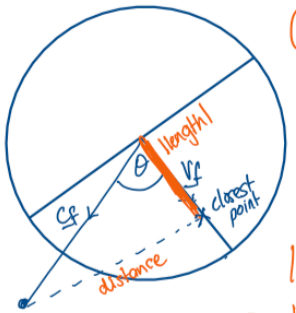
$\underline{c}_f \cdot \underline{v}_f = |c_f||v_f|\cos\theta$

since $\frac{\pi}{2} < \theta < \frac{3\pi}{2}$ $\underline{c}_f \cdot \underline{v}_f < 0$

otherwise since $0 \le \cos\theta \le 1$

$0 < \underline{c}_f \cdot \underline{v}_f < |c_f||v_f|$





② $|c_f|\cos\theta = |\text{length}|$

So if $|c_f|\cos\theta \ge |v_f|$ the closest point is the end of the fibre.

$|c_f|\cos\theta \ge |v_f|$

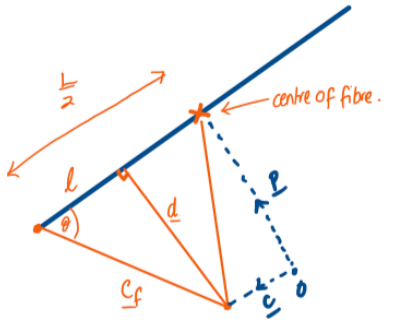
$\Rightarrow |c_f||v_f|\cos\theta \ge |v_f||v_f|$

$\Rightarrow \underline{c}_f \cdot \underline{v}_f \ge |v_f||v_f|$

In the case of ③ the distance between $\underline{c}_f$ and $\underline{v}_f$ is found as follows:

$|\text{length}|^2 = (|c_f|\cos\theta)^2 = \left[\frac{(\underline{c}_f \cdot \underline{v}_f)}{|v_f|}\right]^2$

then distance $= \sqrt{|c_f|^2 - |\text{length}|^2}$



$|c_f|\cos\theta = \ell$