$$\sum F_{x'} = 0$$

which means that

$$P' - P \cos\theta = 0$$

Or that

$$P' = P \cos\theta$$

Now it is possible to write an expression for the stress σ' in terms of P' and A' using the above expression and the relationship between A and A' [Figure (a)]:

$$\sigma' = \frac{P'}{A'}$$

$$= \frac{P\cos\theta}{\frac{A}{\cos\theta}} = \frac{P}{A}\cos^2\theta$$

However, it is the case that $P/A = \sigma$; and, after making this substitution into the above expression, we have Equation 6.4a--that is

$$\sigma' = \sigma \cos^2\theta$$

Now, for static equilibrium in the y' direction, it is necessary that

$$\sum F_{y'} = 0$$

$$= -V' + P\sin\theta$$

Or

$$V' = P\sin\theta$$