

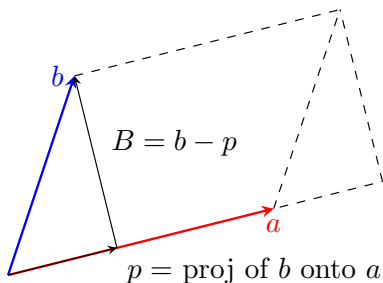
Areas in 2D

Therefore

$$A^2 = \|a\|^2 \|b\|^2 = \det(K^T K) = \det K^T \det K = (\det K)^2$$

and we now have our result.

What do we do when a and b are not orthogonal? A figure is useful here:



Clearly the area of the parallelogram and the rectangle are the same.