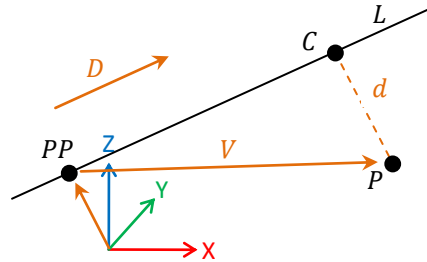


## Plücker Line – Distance from Point to Line

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The distance from a point to the line can be calculated using the principal point ( $PP$ ) and some simple trigonometry.



The principal point is defined by:

$$PP_x = \hat{D}_y \cdot M_z - \hat{D}_z \cdot M_y$$

$$PP_y = \hat{D}_z \cdot M_x - \hat{D}_x \cdot M_z$$

$$PP_z = \hat{D}_x \cdot M_y - \hat{D}_y \cdot M_x$$

The vector between the principal point and the point of interest is calculated by:

$$V_x = P_x - PP_x$$

$$V_y = P_y - PP_y$$

$$V_z = P_z - PP_z$$

Taking the dot product of the principal point vector and the vector  $V$  gives the distance from the point to the line.

$$d = (P_x - PP_x) \cdot PP_x + (P_y - PP_y) \cdot PP_y + (P_z - PP_z) \cdot PP_z$$