Preview: Setting Up an Optical System

Preview of setting up an optical system.

WE'LL COVER THE FOLLOWING

- Preview

Preview

In optical physics, light can be described using **Jones calculus**.

Light polarization is represented by a **Jones vector**, with dimensions 2×1:

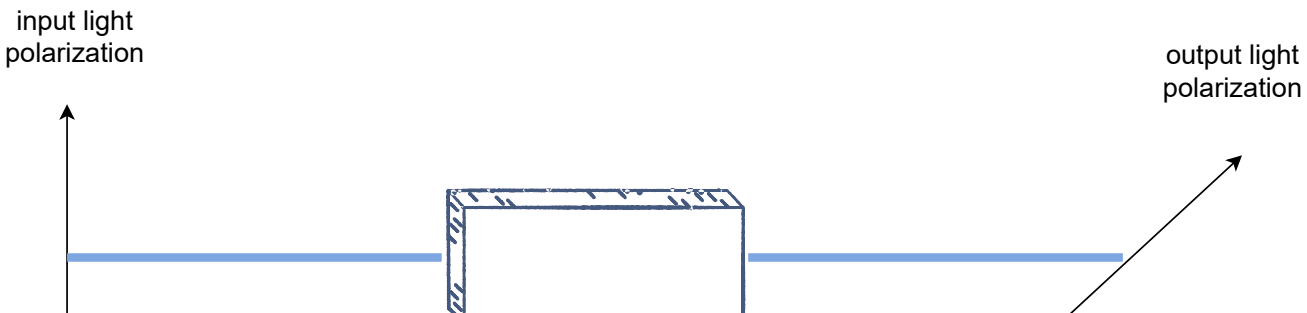
> 💡 Each light polarization has its distinct Jones vector.

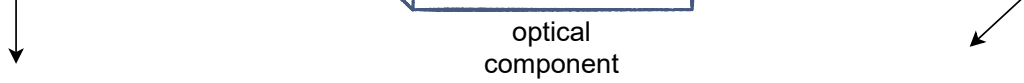
$$\begin{bmatrix} x \\ y \end{bmatrix}$$

and all optical elements are represented by **Jones matrices**, with dimensions 2×2:

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

> 💡 Each element has a distinct Jones matrix.





When light crosses an optical element, the resulting polarization of the emerging light is found by taking the product of the Jones matrix from the optical element and the Jones vector from the incident light.

The above picture can be mathematically represented as:

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

System Matrix

If there is more than one optical component, we must multiply all the matrices to get the **system matrix**. It can be mathematically represented as:

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix} \begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix} \begin{bmatrix} a_3 & b_3 \\ c_3 & d_3 \end{bmatrix} \cdots \begin{bmatrix} a_n & b_n \\ c_n & d_n \end{bmatrix}$$

The system matrix is then multiplied with the input vector to get the output polarization vector.

In the next lesson, you will be presented with problems about setting up an optical system.