Structural Mechanics

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Civil Technology
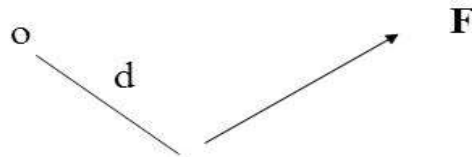
Chapter: 3

Define the term moment

Definition: Moment

Common-sense definition:

Magnitude: $M = F \cdot d$

Direction: is perpendicular to the plane defined by the force and the rotation center and can be determined by the right-hand rule.

Vector representation: $\mathbf{M} = \mathbf{r} \times \mathbf{F}$

$\mathbf{r}$ is a position vector from the rotation center to any point on the line of action of the force.

Varigon's Principle of moment

Varignon's Theorem

- The moment about a give point O of the resultant of several concurrent forces is equal to the sum of the moments of the various moments about the same point O.

$$\vec{r} \times (\vec{F}_1 + \vec{F}_2 + \square\ ) = \vec{r} \times \vec{F}_1 + \vec{r} \times \vec{F}_2 + \square$$

- Varignon's Theorem makes it possible to replace the direct determination of the moment of a force F by the moments of two or more component forces of F.
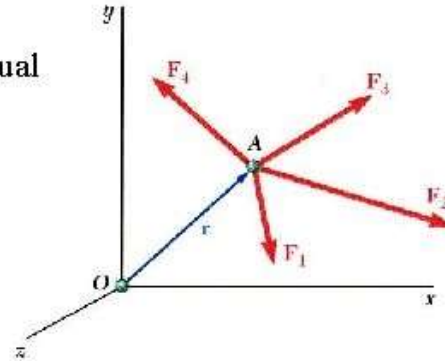
State the meaning of couple

Definition. A **couple** is a pair of forces, equal in magnitude, oppositely directed, and displaced by perpendicular distance or moment. The simplest kind of **couple** consists of two equal and opposite forces whose lines of action do not coincide.