

27: Conservative Forces

A conservative force is one which has the following properties:

- The work done by the force is independent of path.
- The work done by the force over a closed path is zero:

$$\oint \mathbf{F} \cdot d\mathbf{r} = 0 \quad (27.1)$$

- The force can be written as the derivative of a potential energy function U :

$$F = -\frac{dU}{dx} \quad (27.2)$$

These three properties are all equivalent statements of the same thing. Examples of conservative forces are gravity and the electrostatic force.

Some forces, such as friction, are not conservative. Such forces have no corresponding potential energy function. For the frictional force, for example, the work done does depend on the path taken by the body, and the frictional force has no potential energy function.

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