

Physics Booklet

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Classical Mechanics

1.1 Kinematics

1.1.1 Basic concepts

- Velocity

$$\vec{v}(t) = \frac{d\vec{r}}{dt}$$

$\vec{r}(t)$: position

- Speed

$$v = |\vec{v}| = \left| \frac{d\vec{r}}{dt} \right|$$

- Acceleration

$$\vec{a}(t) = \frac{d\vec{v}}{dt}$$

- Other rates

– Jerk

$$\vec{j}(t) = \frac{d\vec{a}}{dt}$$

– Snap

$$\vec{s}(t) = \frac{d\vec{j}}{dt}$$

– Crackle

$$\vec{c}(t) = \frac{d\vec{s}}{dt}$$

– Pop

$$\vec{p}(t) = \frac{d\vec{c}}{dt}$$

1.2 Forces

1.3 Energy

1.4 Momentum

1.5 Angular momentum

1.6 Lagrangian method

Relativistic Mechanics

Electromagnetism

Thermodynamics

Statistical mechanics

Quantum mechanics