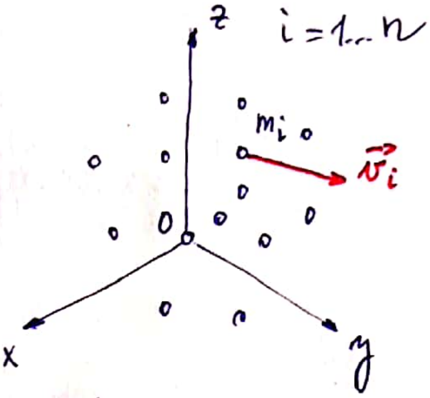
KINETIC ENERGY OF SYSTEM OF PARTICLES



$$K = \sum_{i=1}^{n} \frac{1}{2} m_i v_i^2$$

It is a sum of kinetic energies of individual particles.

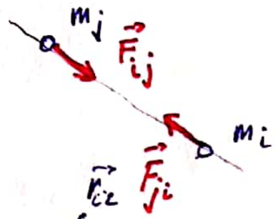
For further calculation we will not divide forces to external ($\vec{F}^E$) and internal ($\vec{F}_{ji}$).

Now it is convenient to devide forces to WORKING forces ($\vec{F}^W$) and REACTIONAL forces ($\vec{F}^R$)

→ makes mechanical work

→ doesn't make mechanical work

Based on the law of change of kinetic energy of particle:



$$(i) \quad \frac{1}{2} m_i v_{i2}^2 - \frac{1}{2} m_i v_{i1}^2 = \int_{\vec{r}_{i1}}^{\vec{r}_{i2}} \vec{F}_i^W d\vec{r}_i + \int_{\vec{r}_{i1}}^{\vec{r}_{i2}} \vec{F}_i^R d\vec{r}_i \quad / \sum_{i=1}^{n}$$

$$\sum_{(i)} \frac{1}{2} m_i \vec{v}_{i2}^2 - \sum_{(i)} \frac{1}{2} m_i v_{i1}^2 = \sum_{i=1}^{n} \int \vec{F}_i^W d\vec{r}_i \qquad \Bigg| \qquad \sum_{i=1}^{n} \int_{\vec{r}_{i1}}^{\vec{r}_{i2}} \vec{F}_i^R d\vec{r}_i = \emptyset$$

$$\boxed{K_2 - K_1 = W^W}$$

Change of kinetic energy of system of particles between two states is equal to work of working forces between two states.

If all forces acting on the system are potential forces then the law of conservation of mechanical energy is aplicable also in the case of system of particles:

$$\boxed{\underbrace{K_1}_{\text{kinetic energy}} + \underbrace{V_1}_{\text{potential energy}} = K_2 + V_2 = \text{const.}}$$