

## KUCHNING ENERGIYA O'ZGARISH ORQALI IFODASI

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**Annotatsiya:** Mazkur maqolada mexanik kuchning bajarilgan ish va energiya o'zgarishi bilan bog'liqligi tahlil qilinadi. Kuchni energiya o'zgarishlari orqali ifodalash usullari keltirib o'tilgan bo'lib, ularning fizik ma'nosi, formulalari va amaliy qo'llanilishi ko'rib chiqiladi. Keltirilgan nazariy qarashlar misollar bilan boyitilgan.

**Kalit so'zlar:** Kuch, energiya, ish, kinetik energiya, potentsial energiya, mexanik tizim, fizik qonun, differensial tenglama...

## EXPRESSION OF FORCE THROUGH ENERGY TRANSFORMATION

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**Abstract:** This article analyzes the relationship between mechanical force, the work done, and the change in energy. Various methods of expressing force through energy transformations are presented, along with their physical meanings, mathematical formulas, and practical applications. The theoretical concepts discussed are supported with illustrative examples.

**Keywords:** Force, energy, work, kinetic energy, potential energy, mechanical system, physical law, differential equation.

## KUCHNING ENERGIYA O'ZGARISH ORQALI IFODASI

Kuyidagi elektromexanik sistemada hosil bo'ladigan kuch (moment) ning tenglamasini topishni ko'rib o'tamiz.

Bitta qo'zg'atish cho'lg'ami bo'lgan sistemani ko'rib chiqamiz. CHulg'a-mining qarshiligini hisobiga olmagan holda, elektr tenglikning shar-tini quyidagi ko'rinishda yozish mumkin:

$$U \approx e = L \frac{di}{dt} = \frac{d\psi}{dt} . \quad (1)$$

Ma'lumki energetik balansni esa quyidagi tenglama ifodalaydi:

$$dW_{\text{эл}} = dW_{\text{маг}} + dW_{\text{мех}}, \quad \text{bu erda } dW_{\text{мех}} = f dx.$$

Quvvatni topsak

$$f \frac{dx}{dt} + \frac{dW_{\text{маг}}}{dt} = \frac{dW_{\text{эл}}}{dt} = U i = e i = i \frac{d\psi}{dt}. \quad (2)$$

$W_{\text{маг}} = \frac{1}{2} \psi i$  ekanligini hisobga olsak va hosilasini ko'rsak:

$$\frac{dW_{\text{маг}}}{dt} = \frac{1}{2} \left( \psi \frac{di}{dt} + i \frac{d\psi}{dt} \right). \quad (3)$$

SHunday qilib, (1), (2) va (3)- tenglamalarga asosan quyidagiga ega bo'lamiz

$$f \frac{dx}{dt} + \frac{1}{2} I \frac{d\psi}{dt} = I \frac{d\psi}{dt}. \quad (4)$$

(1.19) dan shu narsa ko'rinadiki, agarda konturdagi tok  $I = \text{const}$  bo'lsa, u holda (1.19) tenglama quyidagi ko'rinishni egallaydi:

$$f \frac{dx}{dt} + \frac{1}{2} I \frac{d\psi}{dt} = I \frac{d\psi}{dt}. \quad (5)$$

(1.20) tenglamadan

$$f = \frac{1}{2} I \frac{d\psi}{dt} \bigg|_{\psi=\text{const}} = \frac{\partial \psi}{\partial t} \bigg|_{\psi=\text{const}} \quad (6)$$

$I = \text{const}$   $I = \text{const}$  ga ega bo'lamiz.

Agar  $\psi = \text{const}$  bo'lsa, (1.19) tenglama quyidagi ko'rinishga ega bo'ladi:

$$f \frac{dx}{dt} + \frac{1}{2} \psi \frac{di}{dt} = 0,$$

bundan

$$f = -\frac{1}{2} \psi \frac{di}{dx} \bigg|_{\psi=\text{const}} = -\frac{\partial W_{\text{маг}}}{\partial x} \bigg|_{\psi=\text{const}} \quad (8)$$

$\psi = \text{const}$   $\psi = \text{const}$  ga ega bo'lamiz.

Kuch va energiya o'rtasidagi bog'liqlik fizikaning muhim qonunlaridan biridir. Kuchni energiya o'zgarishi orqali aniqlash matematik jihatdan qulay va fizik mazmunan aniq yondashuv hisoblanadi. Bu bog'liqlikdan texnika,

muhandislik, aerodinamika, mashinasozlik va boshqa ko'plab sohalarda keng foydalaniladi.

### **Foydalanilgan adabiyotlar.**

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