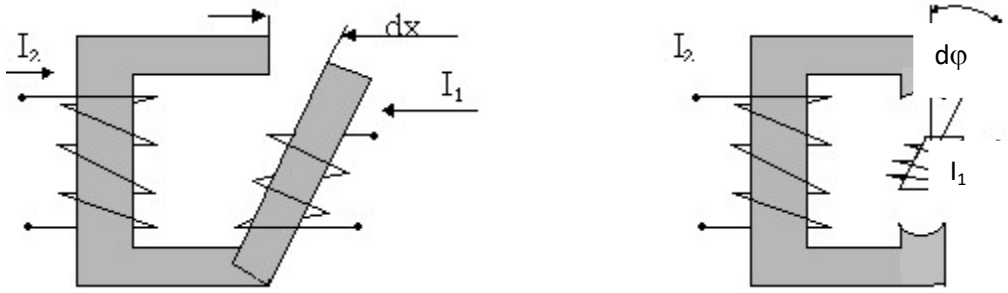
6-Maruza. O`zaro induktivlik o`zgargan holdagi konturlar orasidagi kuchlar va momentlar

5-Maruzadagi xulosalarni L_1 va L_2 induktivliklar va $L_{12}=L_{21}=L$ o`zaro induktivlarga ega bo`lgan 2 ta konturli qurilma uchun qo`llaymiz.

Bunday qurilmaning ko`rinishi 1.3 – rasmda ko`rsatilgan.



1.3- rasm. Ikki konturli qurilma.

Agar konturda I_1 va I_2 toklar oqayotgan bo`lsa, (1.12) tenglamaga asosan magnit maydonida yig`ilgan energiya quyidagicha aniqlanadi:

$$W_{маг} = \frac{1}{2}L_1 I_1^2 + \frac{1}{2}L_2 I_2^2 + LI_1 I_2 .$$

1-konturga (1.3,a- rasm) kichik siljish dx berilsa, (1.21) tenglamaga asosan quyidagi kuchga ega bo`lamiz:

$$f_1 = \frac{\partial W_x}{\partial x} = \frac{1}{2}I_1^2 \frac{\partial L_1}{\partial x} + \frac{1}{2}I_2^2 \frac{\partial L_2}{\partial x} + I_1 I_2 \frac{\partial L}{\partial x} . \qquad (1.23)$$

Xuddi shuningdek 1.3,b – rasmdagi qurilmaning 1-kontur momenti tenglamasini

$$dx = d(ПД\frac{\varphi}{2П}) = \frac{Д}{2}d\varphi$$

ekanligini hisobga olgan holda 2- konturga nisbatdan tok va burchak siljish orqali aniqlash mumkin:

$$m_{1\varphi} = \frac{1}{2} I_1^2 \frac{\partial L_1}{\partial \varphi} + \frac{1}{2} I_2^2 \frac{\partial L_2}{\partial \varphi} + I_1 I_2 \frac{\partial L}{\partial \varphi} \qquad (1.24)$$

Ko`p hollarda induktivlik siljishga bog`liq bo`lmaydi, shu sababli yuqoridagi tenglamalar quyidagi ko`rinishni egallaydi

$$\begin{cases} f_{1x} = I_1 I_2 \dfrac{\partial L}{\partial x} \\ m_{1\varphi} = I_1 I_2 \dfrac{\partial L}{\partial \varphi} \end{cases} \qquad (1.25)$$

Oqim ilashimligining tokka bog`lanishi

$$\begin{cases} \psi_1 = L_1 I_1 + L I_2 \\ \psi_2 = L_2 I_2 + L I_1 \end{cases} \qquad (1.26)$$

ni hisobga olgan holda (1.25) tenglamani boshqaga yozish mumkin

$$\begin{cases} f_{1x} = I_1 \dfrac{\partial \psi_1}{\partial x} \\ m_{1\varphi} = I_1 \dfrac{\partial \psi_1}{\partial \varphi} \end{cases} . \qquad (1.27)$$

(1.27) tenglama shu narsani ko`rsatadiki, induktivligi o`zgarmas bo`lgan konturda kuch yoki moment, oqim ilashimligi o`zgarishi kontur-larning toki yoki guruh konturlari toki ta`sirida sodir bo`lishga qaramasdan hosil bo`ladi.