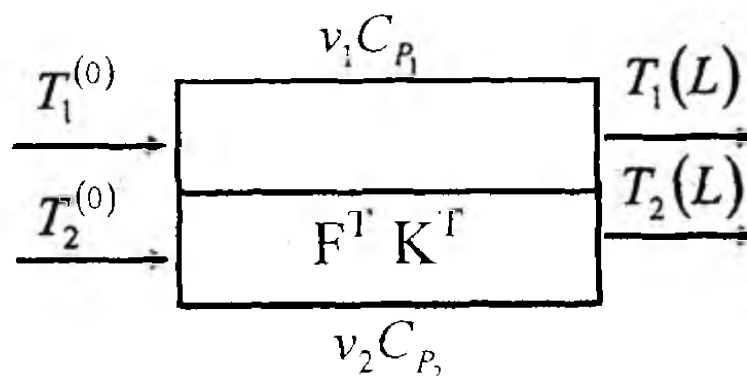


**5. 1.4.3. To'g'ri (bir xil yo'nalishli) oqimli «quvur ichida quvur»
issiqlik almashish apparatlari.**

Koshi masalasini yechish



Statsionar rejim

Faqat issiqlik uzatish yuz beradi

Issiqlik uzatish koeffitsiyenti = const

Oqimlarning issiqlik sig'imi = const

Bo'ylama soha bir xil taqsimlangan

$$\Pi = \frac{F'}{L}$$

Birinchi oqim uchun tenglama:

$$1) v_1 C_{p1} \frac{dT_1}{d\ell} = \frac{F'}{L} \Delta q_1'$$

$$2) \Delta q_1' = K^T (T_2 - T_1)$$

Ikkinchi oqim uchun tenglama:

$$1) v_2 C_{p2} \frac{dT_2}{d\ell} = \frac{F'}{L} \Delta q_2'$$

$$2) \Delta q_2' = K^T (T_1 - T_2)$$

$$\Delta q_1' = \Delta q_2' = -\Delta q_2'$$

Matematik tavsifning tenglamalar tizimi:

(oddiy differensial tenglamalar tizimi)

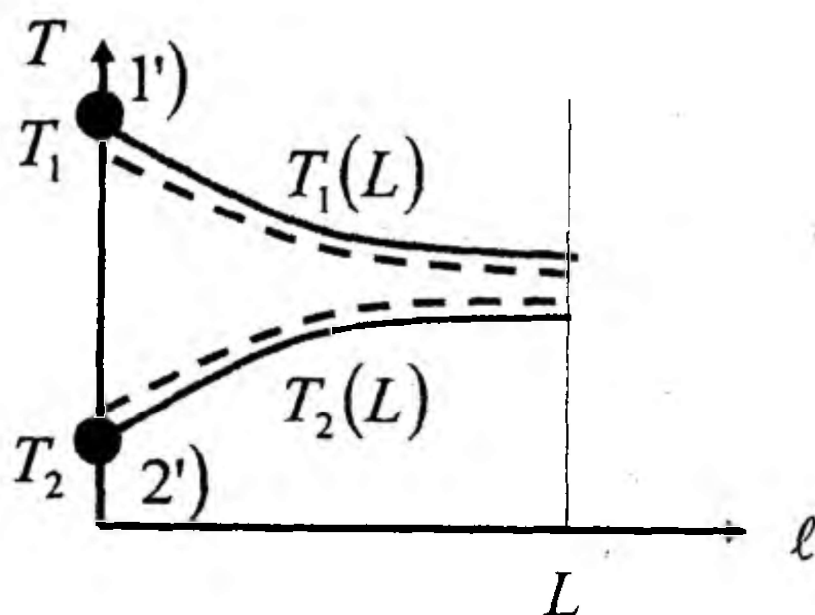
$$\left. \begin{aligned} 1) \frac{dT_1}{d\ell} &= \frac{F'}{Lv_1 C_{p1}} \Delta q_1' \\ 2) \frac{dT_2}{d\ell} &= \frac{F'}{Lv_2 C_{p2}} (-\Delta q_2') \\ 3) \Delta q_1' &= K^T (T_2 - T_1) \end{aligned} \right\}$$

Boshlang'ich shart:

$$\left. \begin{array}{l} 1) T_1(0) = T_1^{(0)} \\ 2) T_2(0) = T_2^{(0)} \end{array} \right\} \ell = 0$$

Xususiy yechimi olinadigan masala, qachonki masalaning qo'shimcha shartlari mustaqil o'zgaruvchining bitta qiymatida berilsa, Koshi masalasi deb ataladi.

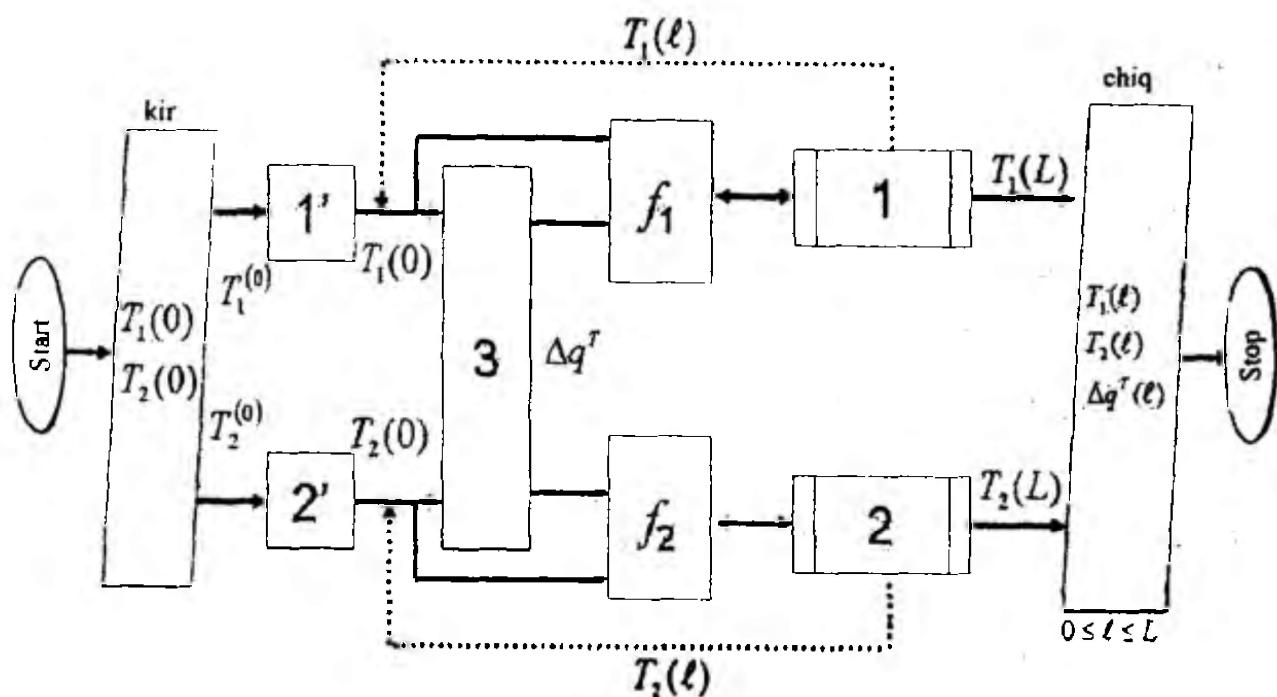
Bu tizimni tahlilga asoslangan aniqlikda yechish mumkin.



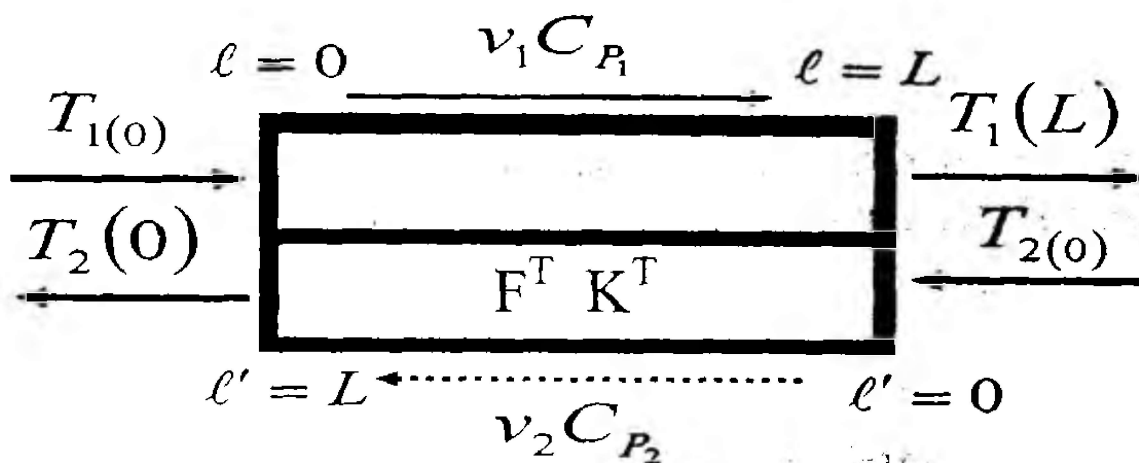
Axborot matritsasi

$n \backslash p$	$T_1(0)$	$T_1(L)$	$T_2(0)$	$T_2(L)$	Δq^T	N^o
1	●	◆			●	4
2			●	◆	●	5
3	●		●		◆	3
4	◆					1
5			◆			2

Algoritmnining blok-sxemasi



5. 1.4.4. Teskarli (qarama-qarshi) oqimli «quvur ichida quvur» issiqlik almashish apparatlari. Chegaraviy masalalarini yechish



$$\left. \begin{array}{l} T_{1(0)} \\ T_{2(0)} \end{array} \right\} \ell = 0$$

$$\ell' = L - l$$

$$d\ell' = -d\ell$$

$$1) \frac{dT_1}{d\ell} = \frac{F^T}{Lv_1 C_{P_1}} \Delta q_1^T$$

$$2) \Delta q_1^T = K^T (T_2 - T_1)$$

.....

$$3) \frac{dT_2}{d\ell} = \frac{F^T}{Lv_2 C_{P_2}} \Delta q_2^T$$

$$4) \Delta q_2^T = K^T (T_1 - T_2)$$

$$\Delta q^T = \Delta q_1^T = -\Delta q_2^T$$

Matematik tavsifning tenglamalar tizimi:

$$1) \frac{dT_1}{d\ell} = \frac{F^T}{Lv_1 C_{P_1}} \Delta q_1^T$$

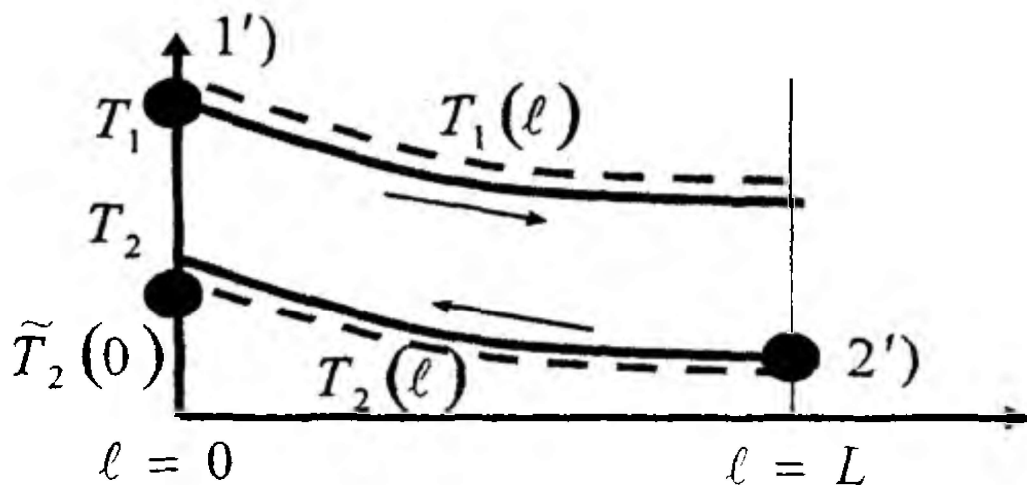
$$2) \frac{dT_2}{d\ell} = \frac{F^T}{Lv_2 C_{P_2}} \Delta q^T$$

$$3) \Delta q^T = K^T (T_2 - T_1)$$

$$T_1(0) = T_{1(0)}$$

$$T_2(0) = T_{2(0)}$$

Chegaraviy shart – mustaqil o'zgaruvchi L ning turli qiymatlarida berilgan qo'shimcha shart. Bunday shartlarda oddiy differensial tenglamalar tizimlarining xususiy yechimlarini olish masalasi chegaraviy masala deb ataladi.



1-qadam – mustaqil o'zgaruvchining bitta qiymatida barcha qo'shimcha shartlari beriladi, masalan,

$$\ell \tilde{T}_2(0) = 0,$$

shu jumladan masalaning boshlang'ich berilishida qatnashmaganlari ham. Oxirgisi xuddi boshlang'ich yaqinlashish kabi beriladi:

2- qadam – oddiy differensial tenglamalar tizimlarini yechish. Biroq olingan yechim noaniq bo'ladi, xuddi qo'shimcha shartlardan biri kabi – $\tilde{T}_2(0)$

– yaqinlashish sifatida berilgan bo'ladi.

3-qadam – 2) chegara shart bajarilishi tekshiriladi.

$$T_2(L)\{\tilde{T}_2(0)\} - T_{2(0)} = 0$$

Agar bajarilmasa, unda 4 - qadam bajariladi.

4-qadam 2) chegaraviy shart xuddi

$$T_{2(0)}$$

yangi yaqinlashishni tanlash uchun to'g'rilovchi tenglama sifatida qaraladi, ya'ni tenglamani yechish amali quyidagi ko'rinishda amalga oshiriladi:













$$T_2(L)\{\tilde{T}_2(0)\} - T_{2(0)} = 0$$

Masalani yechishning tashqi siklida yechim aniqlanadi:

$$T_{2(0)} = ?$$

5-qadam – faqat tenglamaning oxirgi yechimi olingan bo'lib, masalani yechishning tashqi siklida masala yechilgan bo'ladi va masalani yechishning ichki siklida 1) va 2) ODTT (oddiy differensial tenglamalar tizimi) yechimining natijalari to'g'rilangan bo'ladi.

Axborot matritsasi

$n \backslash p$	$T_1(0)$	$T_1(L)$	$T_2(0)$	$T_2(L)$	Δq^T	N^o
1						3
2						4
3						2
4						1
5						5