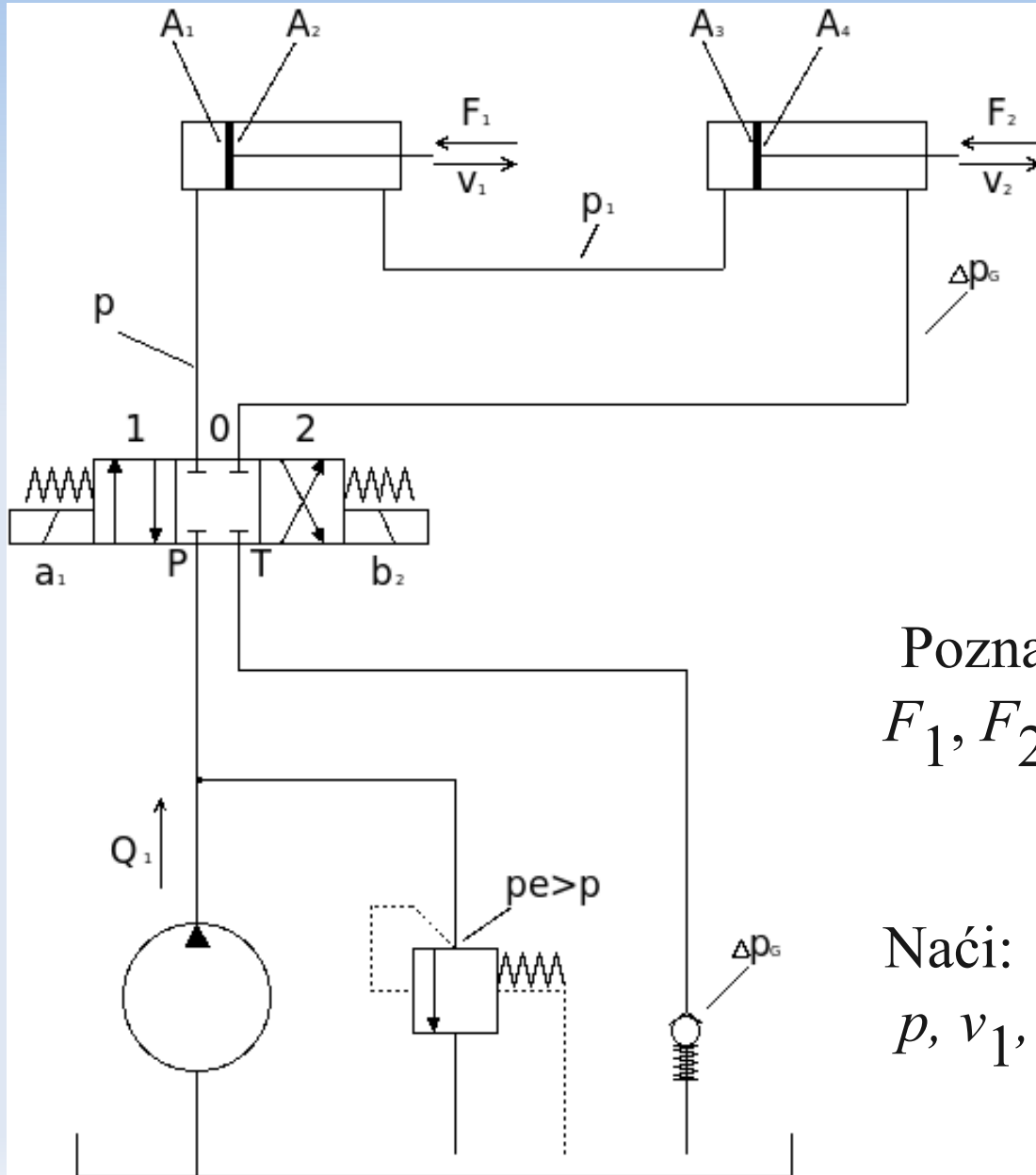


2. AUDITORNA VJEŽBA

ZADACI
IZ
HIDRAULIKE

Mihael Cipek

1. ZADATAK



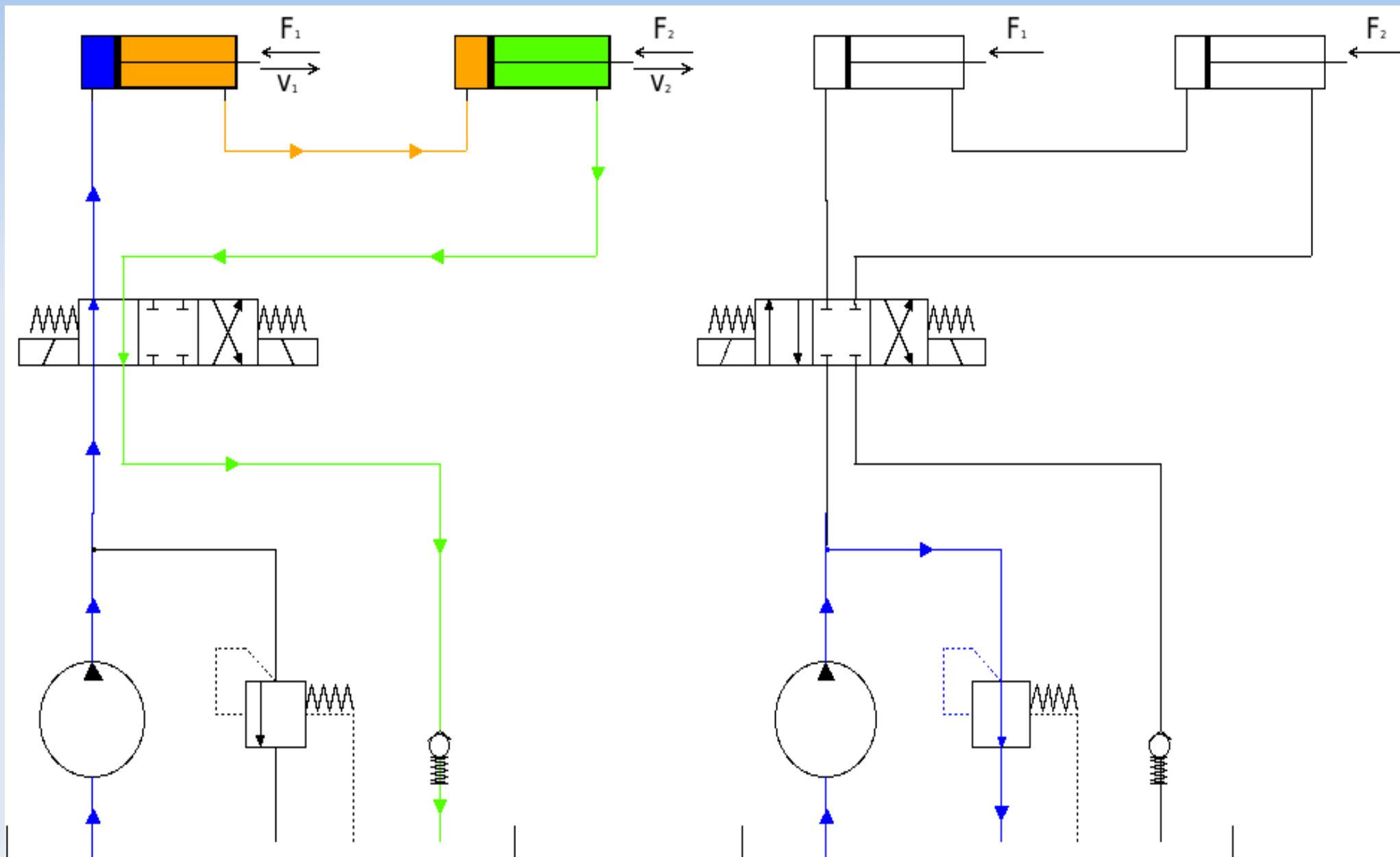
Poznato:

$$F_1, F_2, A_1 \dots A_4, Q_1, \Delta p_G$$

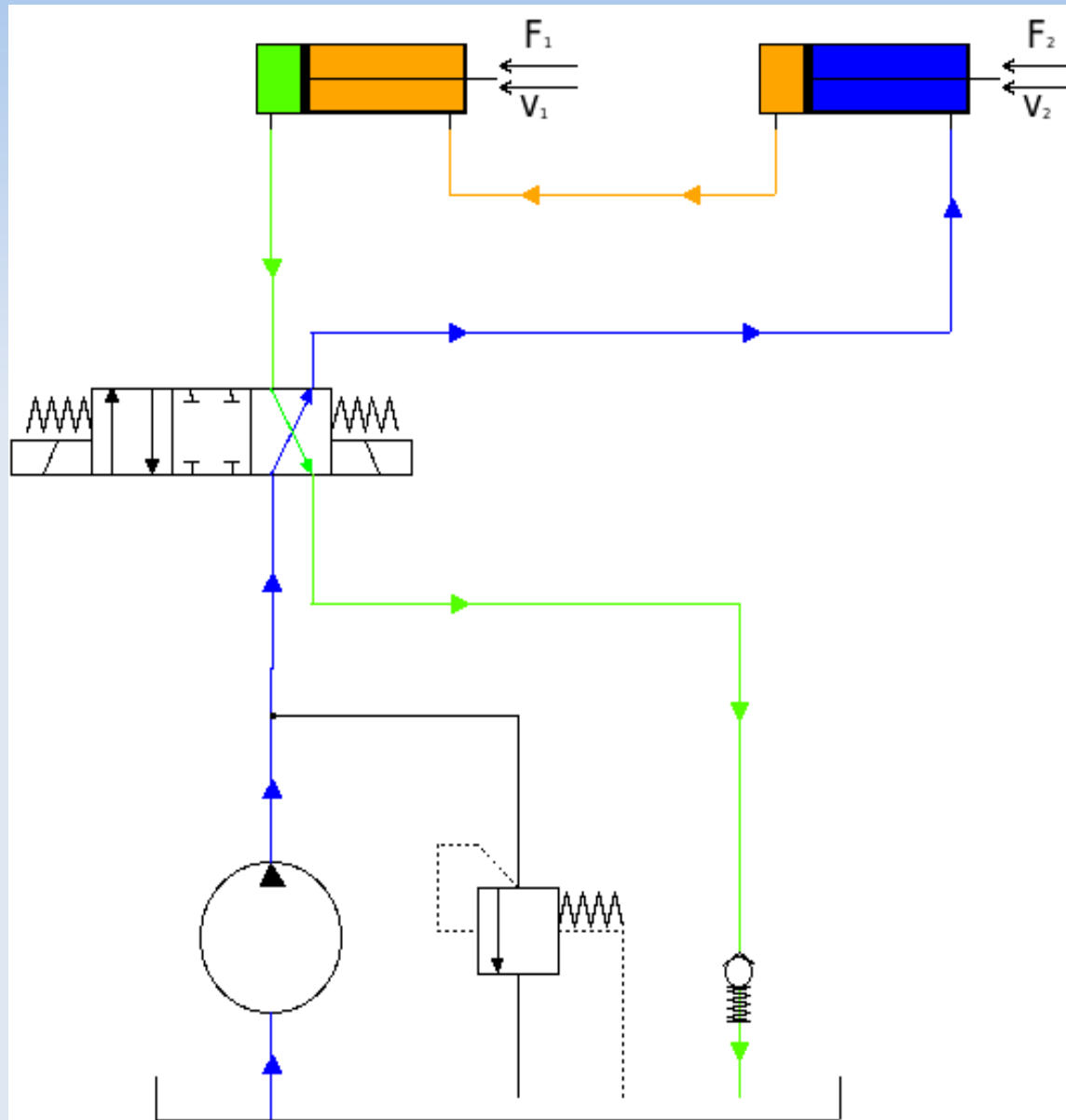
Naći:

$$p, v_1, v_2 = f(F_1, F_2, A_1 \dots A_4, Q_1, \Delta p_G)$$

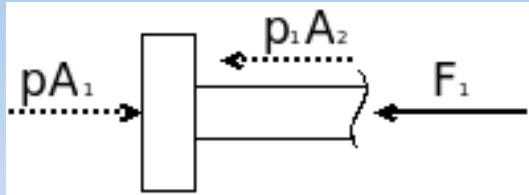
1. ZADATAK



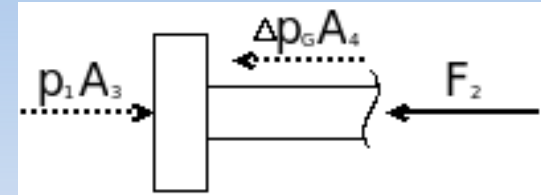
1. ZADATAK



1. ZADATAK



$$pA_1 = p_1 A_2 + F_1 \rightarrow p = p_1 \frac{A_2}{A_1} + \frac{F_1}{A_1} \quad (1)$$



$$p_1 A_3 = \Delta p_G A_4 + F_2 \rightarrow p_1 = \Delta p_G \frac{A_4}{A_3} + \frac{F_2}{A_3} \quad (2)$$

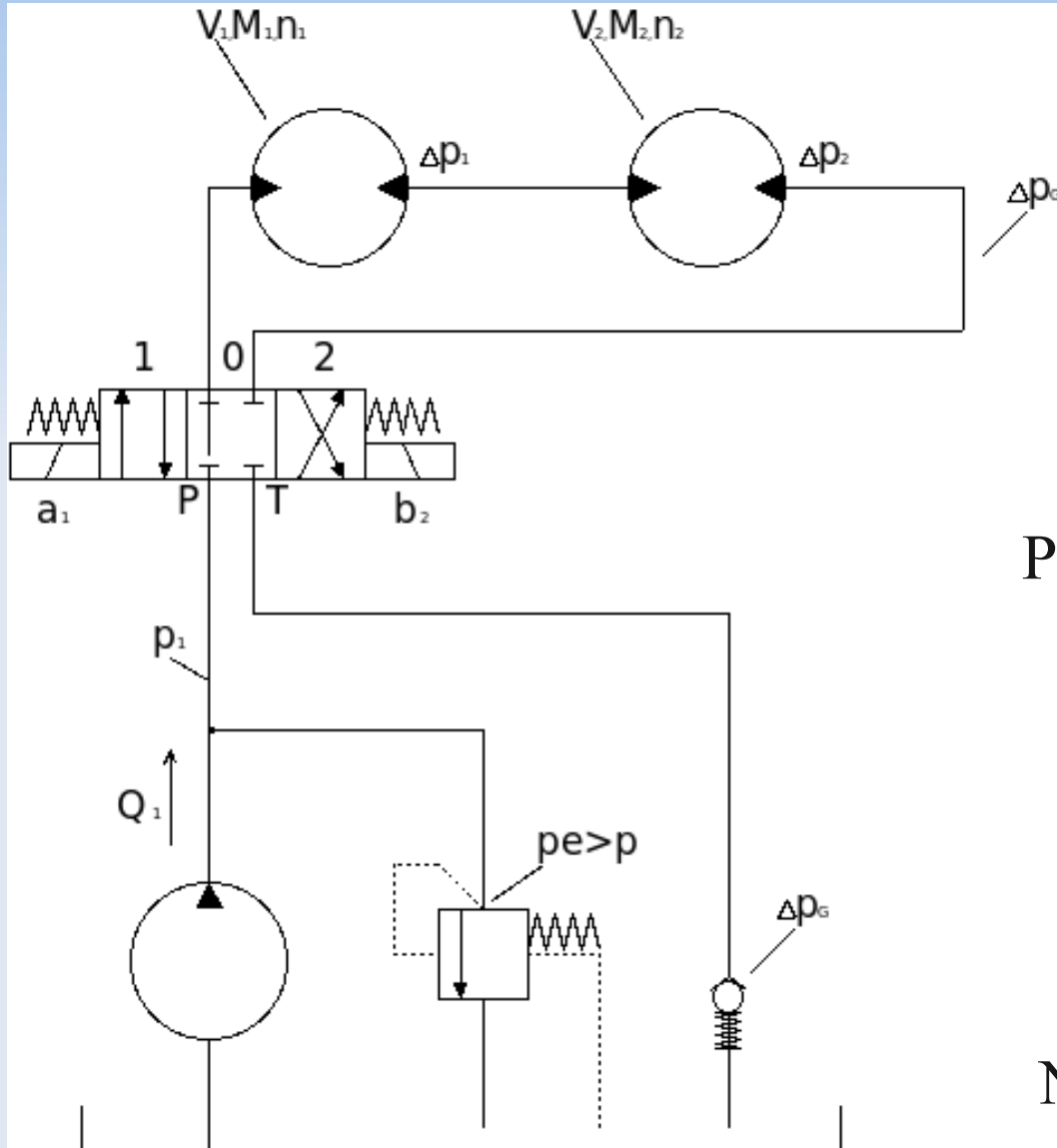
Uvrštavanjem (2) u (1) slijedi:

$$p = \Delta p_G \frac{A_2 A_4}{A_1 A_3} + F_2 \frac{A_2}{A_1 A_3} + \frac{F_1}{A_1}$$

$$Q_1 = v_1 A_1 \rightarrow v_1 = \frac{Q_1}{A_1}$$

$$v_1 A_2 = v_2 A_3 \rightarrow v_2 = v_1 \frac{A_2}{A_3} = Q_1 \frac{A_2}{A_1 A_3}$$

2. ZADATAK



Poznato: $V_1, M_1, n_2, \Delta p_G$

$$M_2 = \frac{1}{2} M_1$$

$$V_2 = \frac{1}{3} V_1$$

Naći: $p, Q_1, n_1 = f(V_1, M_1, n_2, \Delta p_G)$

2. ZADATAK

$$M_1 = \frac{\Delta p_1 V_1}{2\pi} \rightarrow \Delta p_1 = \frac{2\pi M_1}{V_1} \quad (1)$$

Analogija kod motora:

$$M = F \cdot r = \Delta p \cdot \frac{V}{2\pi} \quad P = F \cdot v = \Delta p \cdot Q$$

$$M_2 = \frac{\Delta p_2 V_2}{2\pi} \rightarrow \Delta p_2 = \frac{2\pi M_2}{V_2} = \frac{2\pi \frac{1}{2} M_1}{\frac{1}{3} V_1} = \frac{3\pi M_1}{V_1} \quad (2)$$

$$p_1 = \Delta p_G + \Delta p_1 + \Delta p_2 = |\rightarrow (1), (2)| = \Delta p_G + \frac{2\pi M_1}{V_1} + \frac{3\pi M_1}{V_1} = \Delta p_G + \frac{5\pi M_1}{V_1}$$

$$n = \frac{Q}{V} \quad Q [m^3/s] \quad V [m^3] \quad n [rad/s] \quad Q_1 = Q_2$$

$$Q_1 = Q_2 = n_2 V_2 = n_2 \frac{1}{3} V_1 = \frac{n_2 V_1}{3}$$

$$n_1 = \frac{Q_1}{V_1} = \frac{\frac{n_2 V_1}{3}}{V_1} = \frac{n_2}{3}$$