

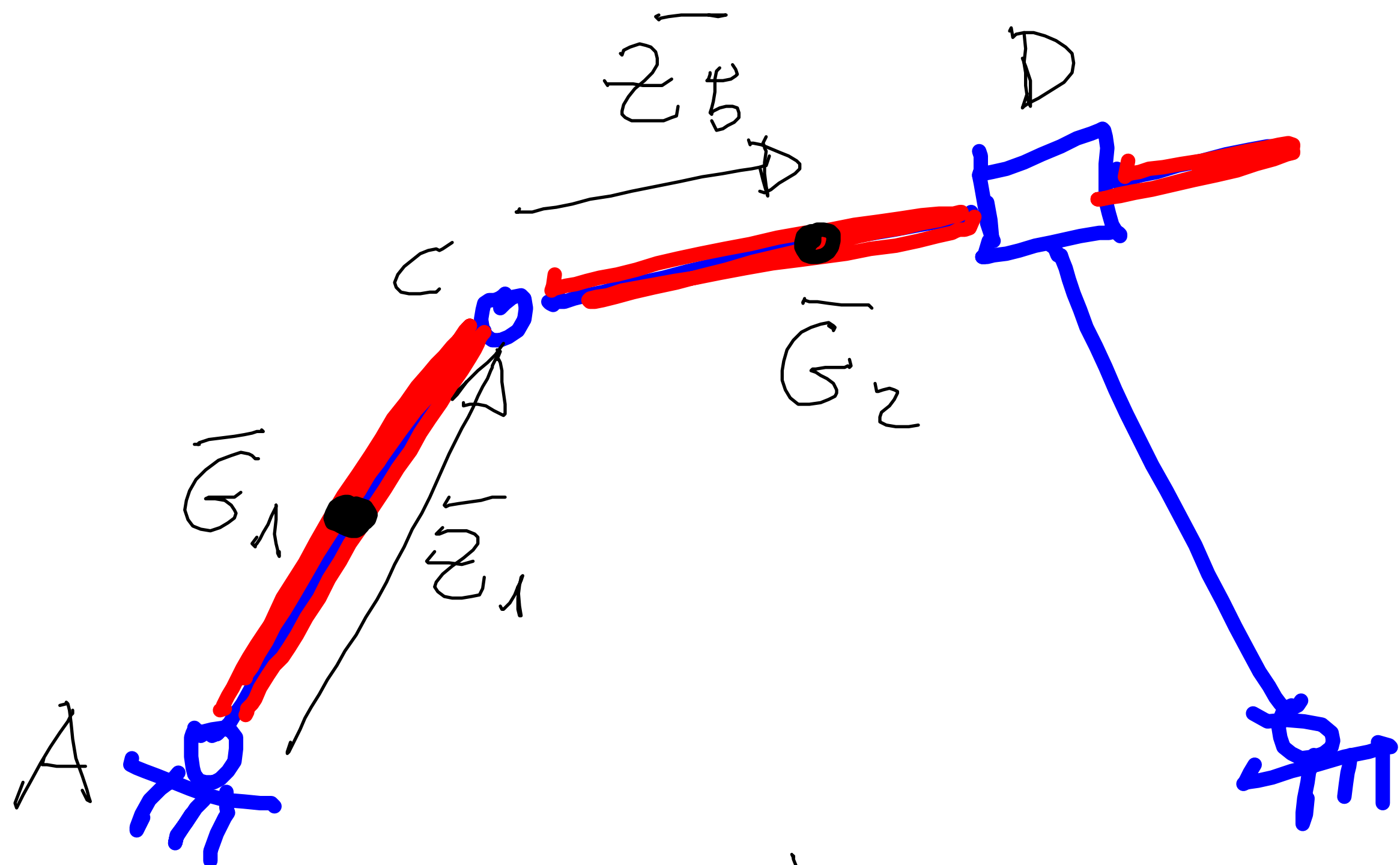
$$J \ddot{x} + A \dot{q} = 0$$

$$J \ddot{x} + J \ddot{x} + A \dot{q} + \cancel{A \dot{q}} = 0 \quad \dot{\varphi}_2$$

$$\ddot{x} = -J^{-1} (\underline{J \ddot{x}} + \underline{A \dot{q}})$$

$$J = \begin{bmatrix} -s \dot{\varphi}_2 \dot{\varphi}_2 & -\dot{z}_2 s \varphi_2 - z_2 c \varphi_2 \dot{\varphi}_2 + z_3 c \varphi_3 \dot{\varphi}_3 \\ c \dot{\varphi}_2 \dot{\varphi}_2 & +\dot{z}_2 c \varphi_2 - z_2 s \varphi_2 \dot{\varphi}_2 + z_3 s \varphi_3 \dot{\varphi}_3 \end{bmatrix}$$

$$A = \begin{pmatrix} -c \dot{q} \\ -s \dot{q} \end{pmatrix} \quad z_1 = -z_1 \dot{q} \quad \begin{pmatrix} c \dot{q} \\ s \dot{q} \end{pmatrix}$$

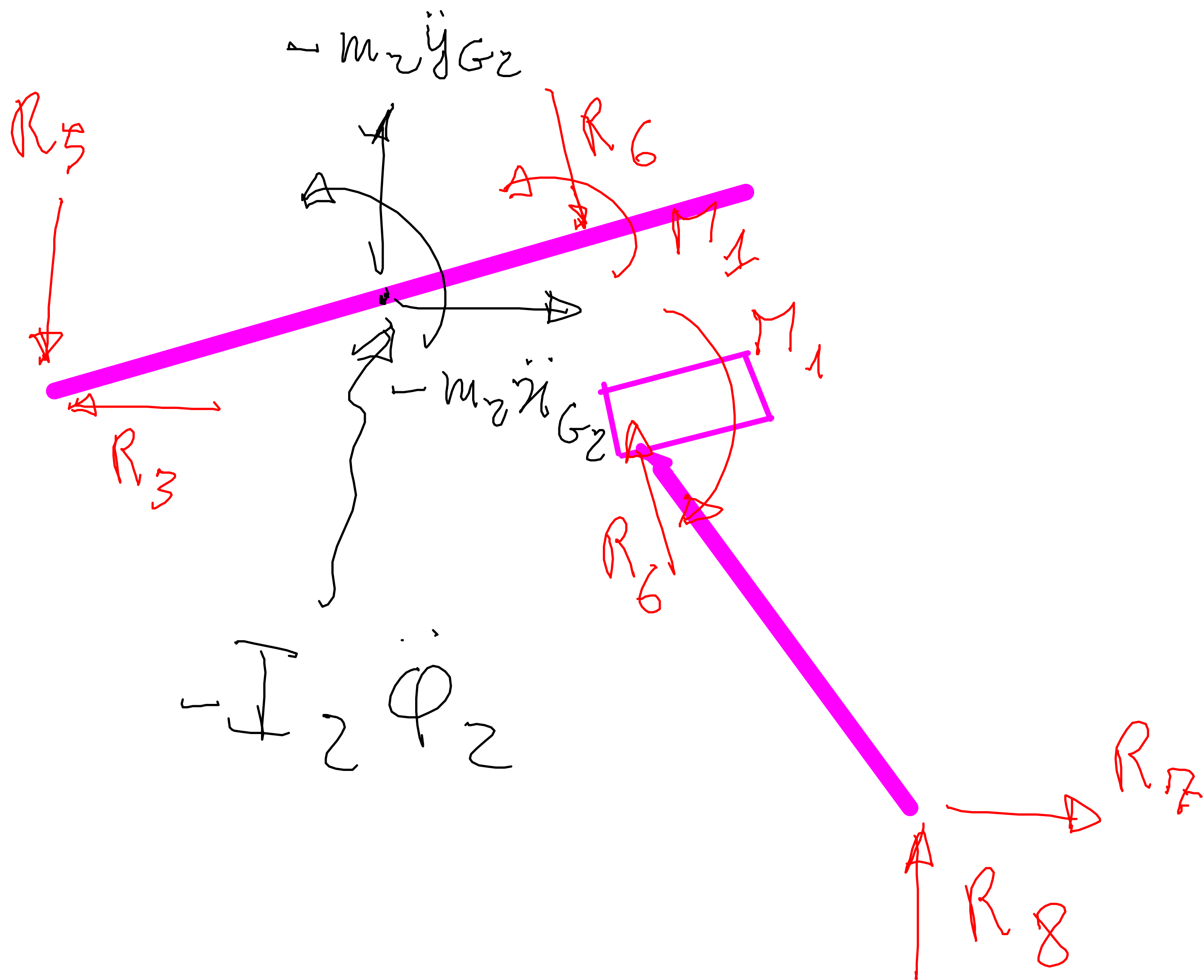
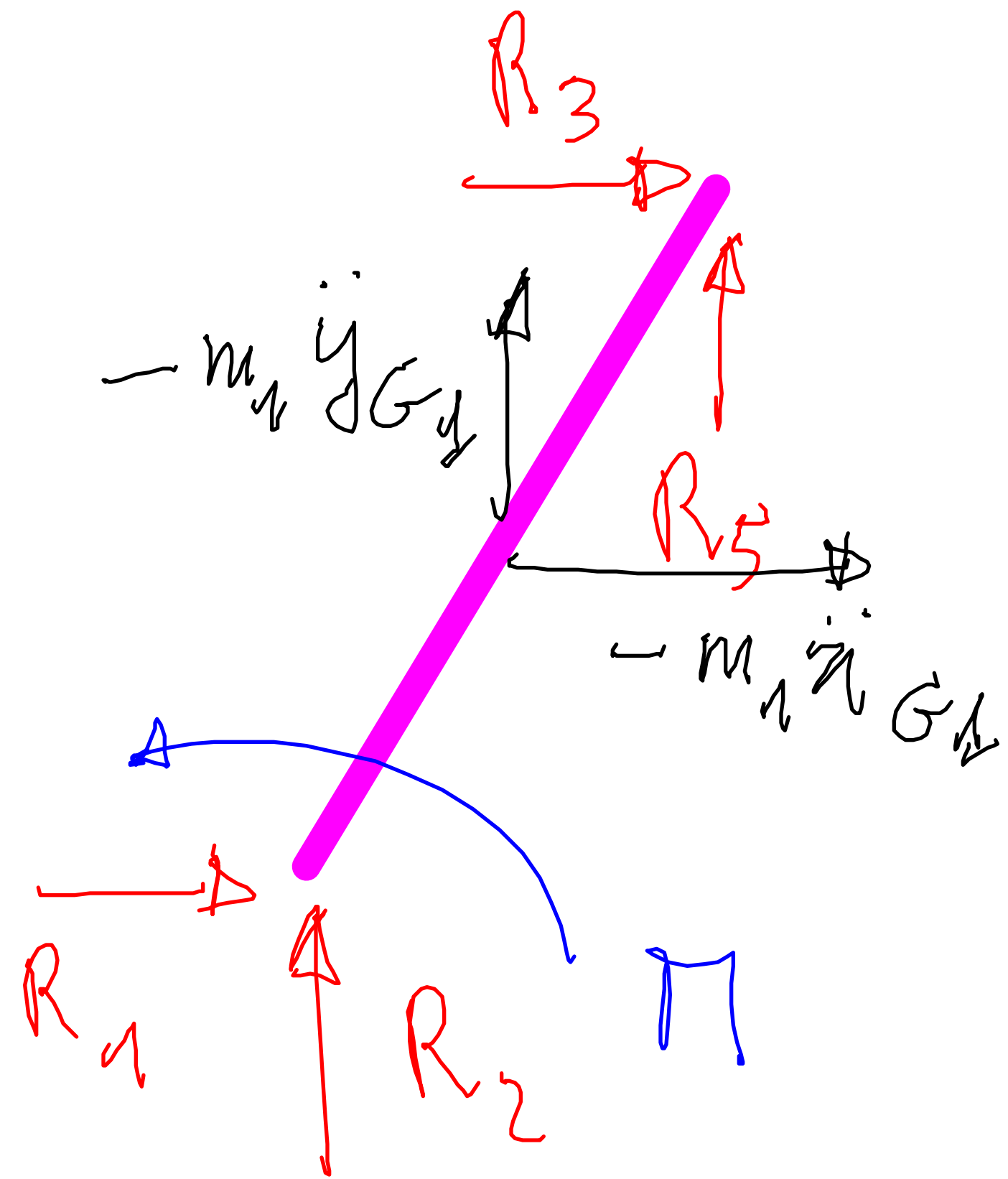


$$G_2 \approx \bar{z}_1 + \bar{z}_5$$

$$\dot{G}_1 = \frac{z_1}{z_1} \begin{Bmatrix} -s q \\ c q \end{Bmatrix} \dot{q} \Rightarrow \dot{G}_1 = \frac{z_1}{z_1} \begin{Bmatrix} -c q \\ -s q \end{Bmatrix} \dot{q}^2$$

$$\dot{G}_2 = z_1 \begin{Bmatrix} -s q \\ c q \end{Bmatrix} \dot{q} + z_5 \begin{Bmatrix} -s \varphi_2 \\ c \varphi_2 \end{Bmatrix} \dot{\varphi}_2$$

$$\dot{G}_2 = z_1 \begin{Bmatrix} -c q \\ -s q \end{Bmatrix} \ddot{q} + z_5 \begin{Bmatrix} -c \varphi_2 \\ -s \varphi_2 \end{Bmatrix} \ddot{\varphi}_2 + z_5 \begin{Bmatrix} -s \varphi_2 \\ c \varphi_2 \end{Bmatrix} \dot{\varphi}_2$$



$$R_1 + R_3 - m_1 \ddot{z}_1 G_1 = 0$$

$$R_2 + R_5 - m_1 \ddot{y} G_1 = 0$$

$$M + R_5 z_1 c \varphi - R_3 z_1 s \varphi = 0$$

$$-R_3 + R_6 s \varphi_2 - m_2 \ddot{z}_2 G_2 = 0$$

$$-R_5 - R_6 c \varphi_2 - m_2 \ddot{y} G_2 = 0$$

$$-m_2 \ddot{z}_2 G_2 z_5 s \varphi_2 - m_2 \ddot{y} G_2 z_2 c \varphi_2 - I_2 \ddot{\varphi}_2 - R_6 z_2 + M_4 = 0$$

$$R_7 - R_6 s \varphi_2 = 0$$

$$R_8 + R_6 c \varphi_2 = 0$$

$$-M_1 - R_6 z_3 c \chi = 0$$

| | | | | | | | |
|---|----|---|----------------------|---|---|---|---|
| 1 | | 1 | | | | | |
| | 1 | 1 | | | | | |
| | | $z_1 s^q / z_1 c^q$ | | | | | 1 |
| | -1 | $s \varphi_2$ | | | | | |
| | | -1 | $c \varphi_2$ | | | | |
| | | | -1 | 1 | | | |
| | | | $s \varphi_2$ | | 1 | | |
| | | | $c \varphi_2$ | | | 1 | |
| | | | $-z_3 c \lambda - 1$ | | | | |

- R_1
- R_2
- R_3
- R_5
- R_6
- R_7
- R_8
- M

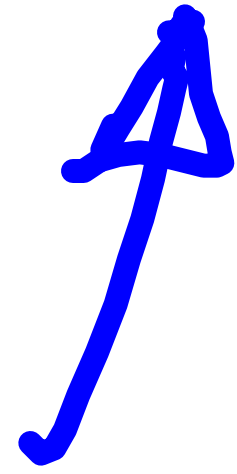
=

- $m_1 \ddot{x}_{G1}$
- $m_1 \ddot{y}_{G1}$
- 0
- $m_2 \ddot{x}_{G2}$
- $m_2 \ddot{y}_{G2}$
- (*)
- 0
- 0
- 0

Q

* = $-m_2 \ddot{x}_{G2} z_3 s \varphi_2 + m_2 \ddot{y}_{G2} z_3 c \varphi_2 + I_2 \ddot{\varphi}_2$

$$S \quad F = \mathbb{Q}$$



Reazioni

M

$$U \quad V$$

$$F =$$

$$S = \mathbb{Q}$$

$$a = \begin{Bmatrix} 1 \\ 2 \\ 3 \end{Bmatrix}$$

$$Mat = \begin{bmatrix} 1 & 0 \\ 2 & 0 \\ 3 & 2 \end{bmatrix}$$

$$Mat(:, 1) = a$$

$$b = \begin{Bmatrix} 0 \\ 0 \\ 2 \end{Bmatrix}$$

$$Mat(:, 2) = b$$