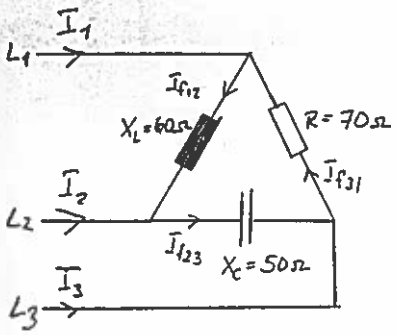
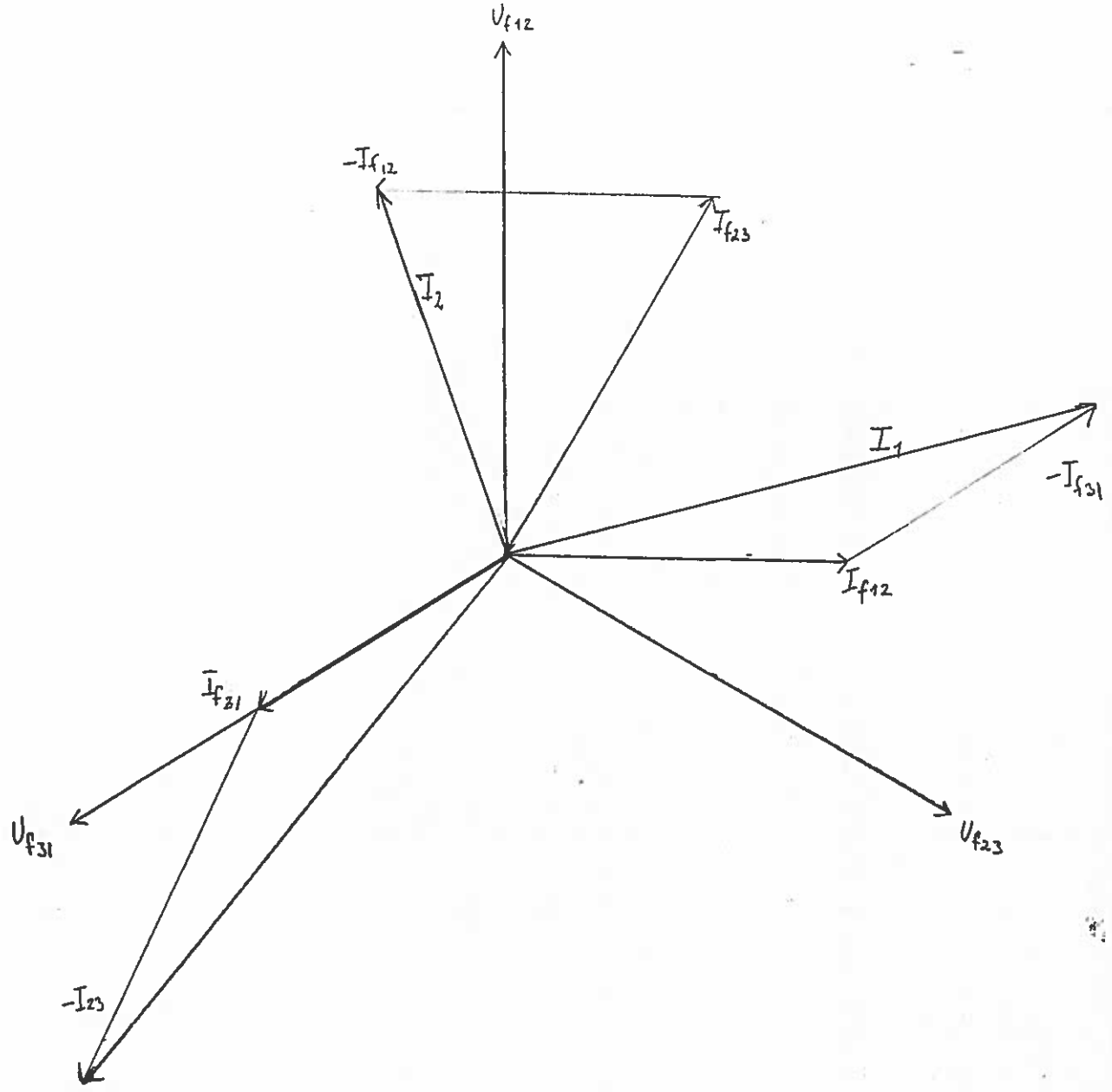
Oppgave 8.3.1



$$I_{12} = \frac{U_{f12}}{X_L} = \frac{220V}{60\Omega} = \underline{3,67A}$$

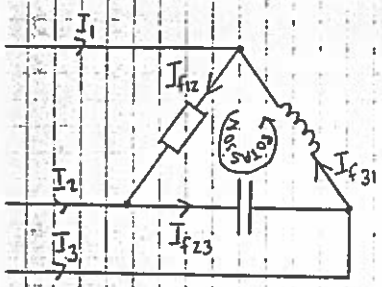
AVLEST: $I_1 = \underline{6,5A}$
$I_2 = \underline{4,1A}$
$I_3 = \underline{7,3A}$



$$I_{f31} = \frac{U_{f31}}{R} = \frac{220V}{70\Omega} = \underline{3,14A}$$

$$I_{f23} = \frac{U_{f23}}{X_C} = \frac{220V}{50\Omega} = \underline{4,4A}$$

IT Oppgave 8.3.2



a) $I_{f12} = \frac{U_{f12}}{R} = \frac{230V}{100\Omega} = \underline{2,3A}$

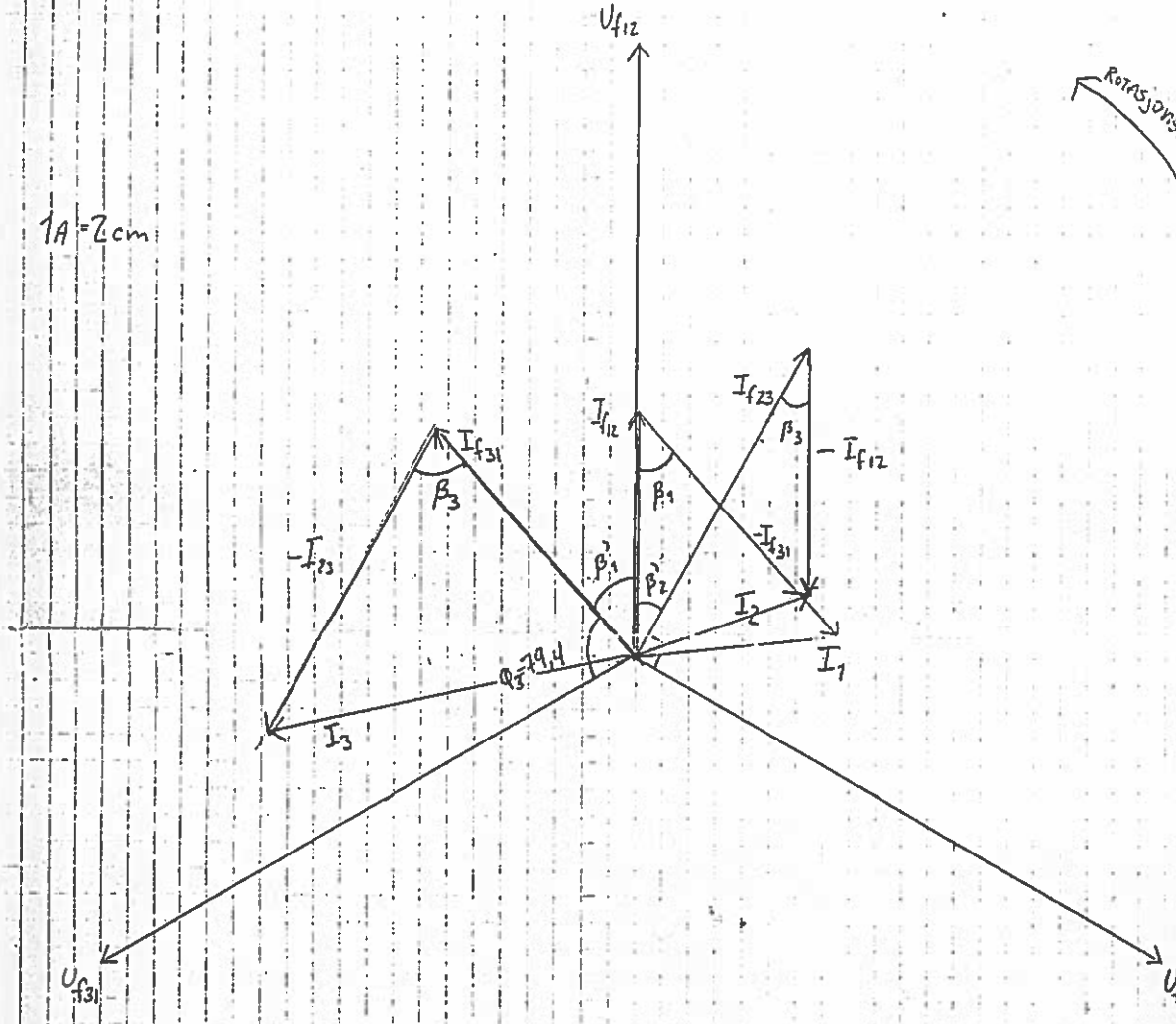
$\beta_1' = \beta = 120° - \varphi_3 = 120° - 79,4° = 40,6°$

$I_1 = \sqrt{I_{12}^2 + I_{31}^2 - 2 \cdot I_{12} \cdot I_{31} \cdot \cos\beta_1'}$

c) $I_1 = \sqrt{2,3A^2 + 2,83A^2 - 2 \cdot 2,3A \cdot 2,83A \cdot \cos 40,6°} = \underline{1,85A}$

d) $P_{f12} = I_{f12} \cdot U_{f12} = 2,3A \cdot 230V = \underline{529W}$

$P_{TOT} = P_{f12} + P_{f23} + P_{f31} = 529W + 0 + 119,8W = \underline{648,8W}$



:
nmen etter
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$\pi f L = \underline{80\Omega}$

$R_S + j X_L = 15\Omega + j\,80\Omega = \underline{81,4\Omega \angle \varphi_3 = 79,4°}$

$\cos\varphi_3 = \underline{0,184}$

$= \frac{U_{f31}}{Z_S} = \frac{230V}{81,4\Omega} = \underline{2,83A}$

$\beta_1' + \beta_2' = 40,6° + 30° = 70,6°$

$\sqrt{I_{31}^2 + I_{23}^2 - 2 \cdot I_{31} \cdot I_{23} \cdot \cos\beta_3}$

$\sqrt{2,83A^2 + 3,29A^2 - 2 \cdot 2,83A \cdot 3,29A \cdot \cos 70,6°} = \underline{3,56A}$

$U_{f31} \cdot I_1 \cdot \cos\varphi_1' = 230V \cdot 2,83A \cdot 0,184 = 119,8W$

Ideell kondensator:
Strømmen 90° foran spenningen

$X_C = \frac{1}{2 \cdot \pi f C} = \underline{70\Omega}$

a) $I_{f23} = \frac{U_{f23}}{X_C} = \frac{230V}{70\Omega} = \underline{3,29A}$

$\beta_2' = B_2 = 120° - 90° = \underline{30°}$

c) $I_1 = \sqrt{I_{23}^2 + I_{12}^2 - 2 \cdot I_{23} \cdot I_{12} \cdot \cos\beta_2}$

$I_1 = \sqrt{3,29A^2 + 2,3A^2 - 2 \cdot 3,29A \cdot 2,3A \cdot \cos 30°} = 1,75A$

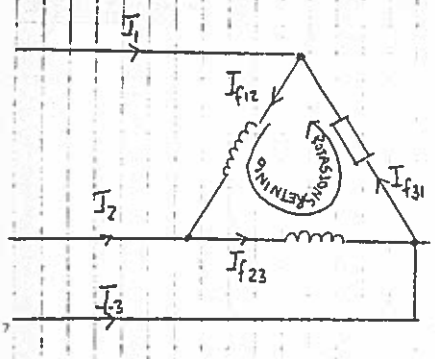
$\alpha = 120° - \varphi_3 = 120° - 79,4° = 40,6°$

$\beta_2 = \alpha + \beta_1' = 40,6° + 30° = \underline{70,6°}$

d) $P = 0W$ (ideell kondensator)

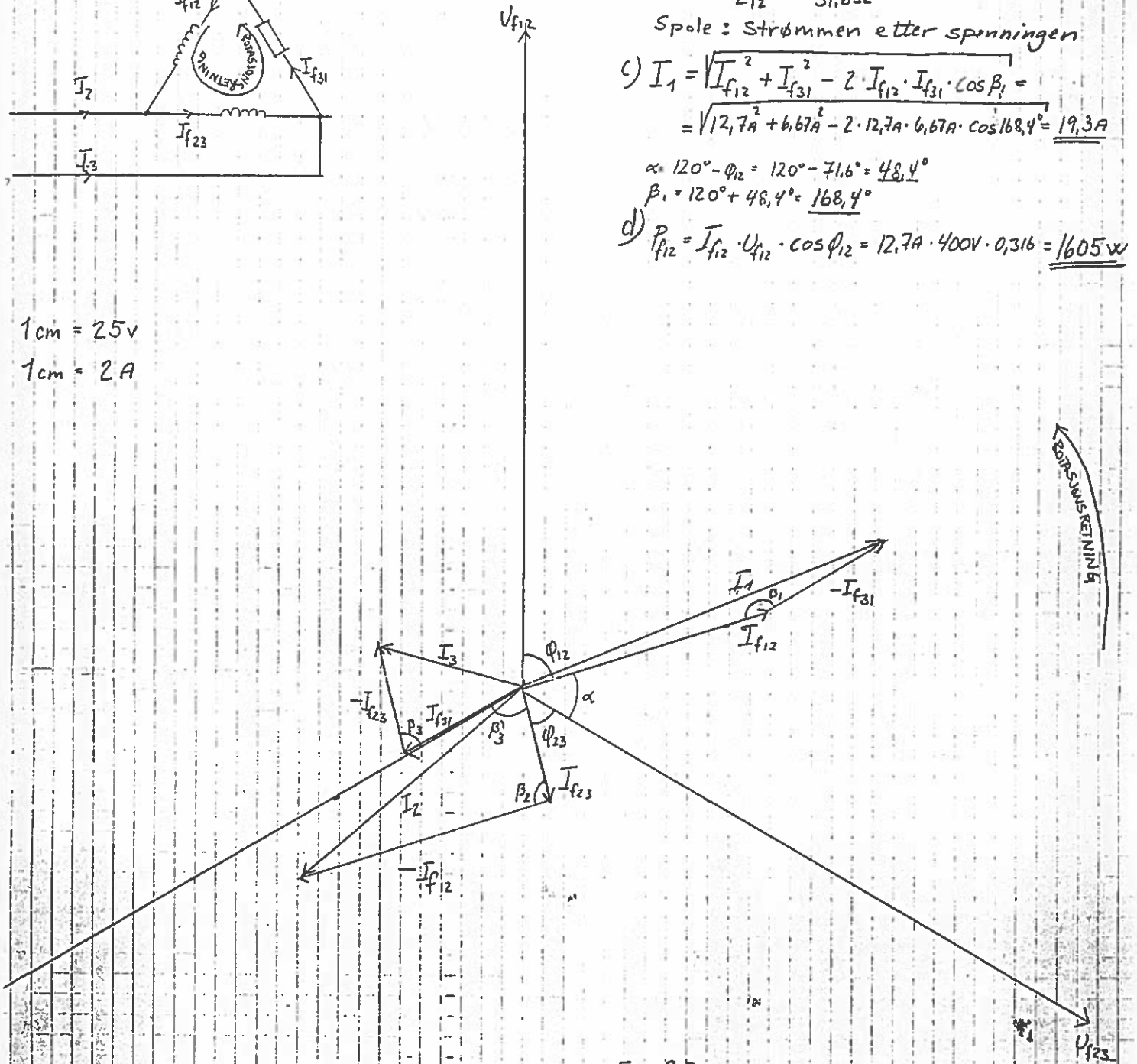
OPPGAVE 8.3.3

1.



1 cm = 25 V

1 cm = 2 A



FAS 12

a) $\bar{Z}_{12} = R_S + jX_L = 10\Omega + j30\Omega = \underline{31,6\Omega} \quad \angle\varphi_{12} = \underline{71,6°}$

$\cos\varphi_{12} = \underline{0,316}$

$I_{f12} = \frac{U_{f12}}{Z_{12}} = \frac{400V}{31,6\Omega} = \underline{12,7A}$

Spole: Strømmen etter spenningen

c) $I_1 = \sqrt{I_{f12}^2 + I_{f31}^2 - 2 \cdot I_{f12} \cdot I_{f31} \cdot \cos\beta_1} =$

$= \sqrt{12,7A^2 + 6,67A^2 - 2 \cdot 12,7A \cdot 6,67A \cdot \cos 168,4°} = \underline{19,3A}$

$\alpha = 120° - \varphi_{12} = 120° - 71,6° = \underline{48,4°}$

$\beta_1 = 120° + 48,4° = \underline{168,4°}$

d) $P_{f12} = I_{f12} \cdot U_{f12} \cdot \cos\varphi_{12} = 12,7A \cdot 400V \cdot 0,316 = \underline{1605W}$

FAS 31

$\frac{U_{f31}}{R_{31}} = \frac{400V}{60\Omega} = \underline{6,67A}$

$\sqrt{I_{f3}^2 + I_{f23}^2 - 2 I_{f31} \cdot I_{f23} \cdot \cos\beta_3}$

$\sqrt{6,67A^2 + 5,66A^2 - 2 \cdot 6,67A \cdot 5,66A \cdot \cos 75°} = \underline{7,5A}$

$120° - \varphi_{23} = 120° - 45° = \underline{75°}$

$U_{f31} \cdot I_{f31} = 400V \cdot 6,67A = \underline{2668W}$

$P_2 + P_{f23} + P_{f31} = 1605W + 1600W + 2668W = \underline{5873W}$

FAS 23

a) $\bar{Z}_{23} = R_S + jX_L = 50\Omega + j50\Omega = \underline{70,7\Omega} \quad \angle\varphi_{23} = \underline{45°}$

$\cos\varphi_{23} = 0,707$

$I_{f23} = \frac{U_{f23}}{Z_{23}} = \frac{400V}{70,7\Omega} = \underline{5,66A}$

Spole: Strømmen etter spenningen

c) $I_2 = \sqrt{I_{f23}^2 + I_{f12}^2 - 2 \cdot I_{f23} \cdot I_{f12} \cdot \cos\beta_2}$

$I_2 = \sqrt{5,66A^2 + 12,7A^2 - 2 \cdot 5,66A \cdot 12,7A \cdot \cos 93,4°} = \underline{14,2A}$

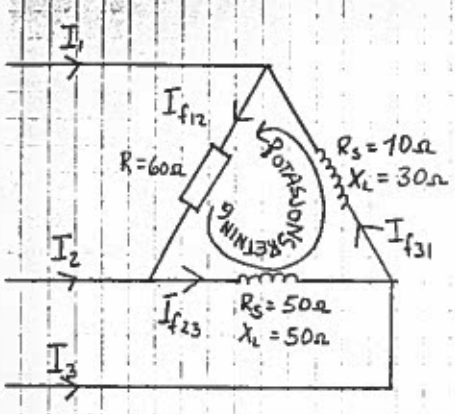
$\alpha = 120° - \varphi_{12} = 120° - 71,6° = \underline{48,4°}$

$\beta_2 = \alpha + \varphi_{23} = 48,4° + 45° = \underline{93,4°}$

d) $P_{f23} = U_{f23} \cdot I_{f23} \cdot \cos\varphi = 400V \cdot \ldots$

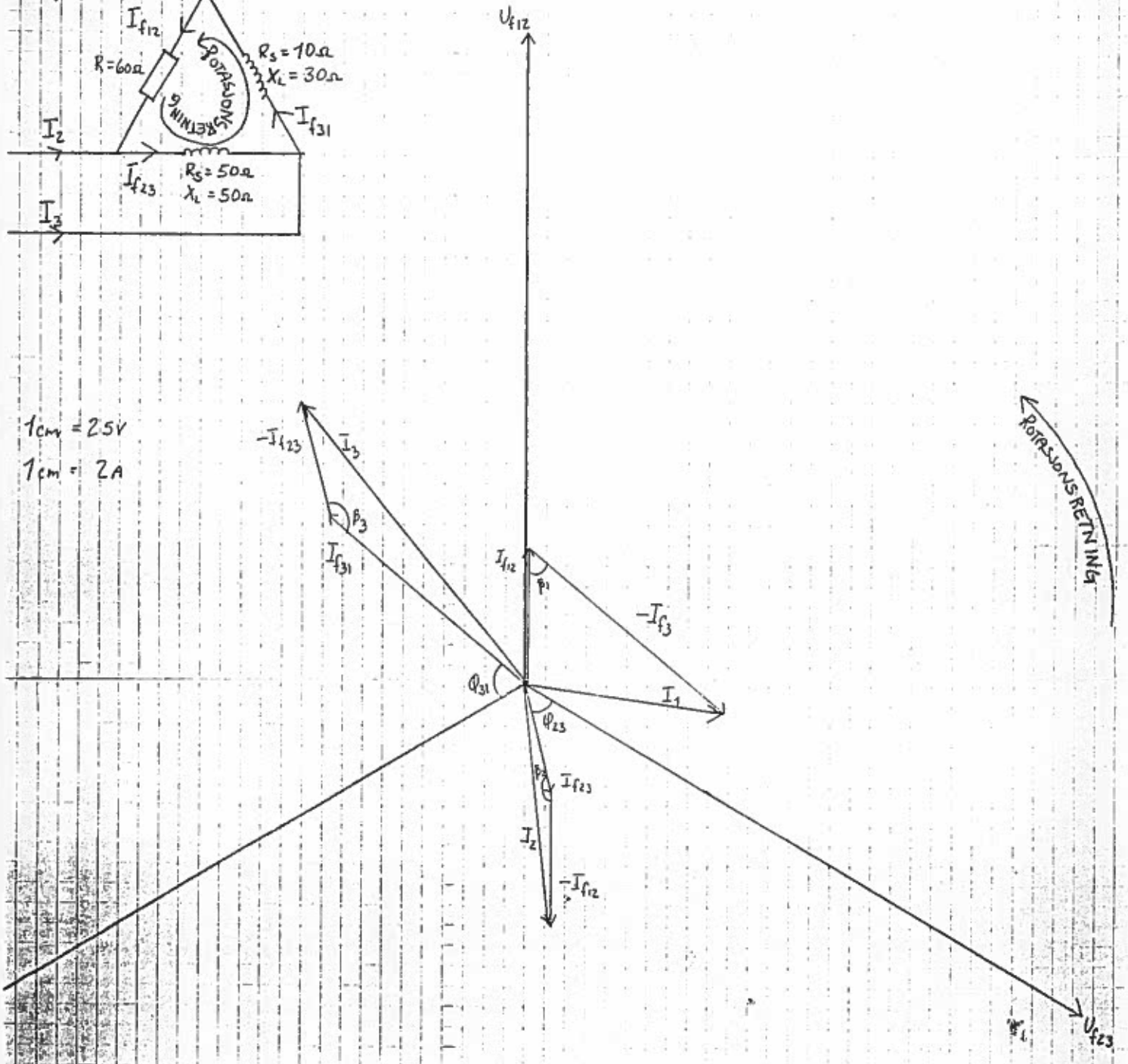
PPGAVE 8.3.3

)EL 2



FAS 12

$I_{f12} = 6{,}67A$



s 31

= 12,7 A $\angle\varphi_{31} = 71{,}6°$ $\cos\varphi_{31} = 0{,}316$

FASS 23

$I_{f23} = 5{,}66A$ $\angle\varphi_{23} = 45°$ $\cos\varphi_{23} = 0{,}707$