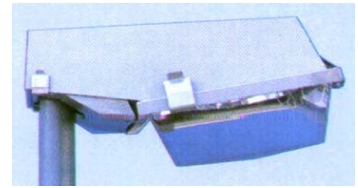
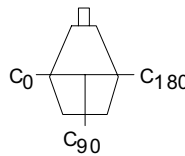
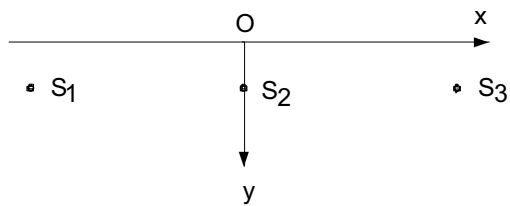


1 ПРОГРАМСКА ЗАДАЧА

а) Пресметка со дијаграм за распределба на светлинската јачина

	1	2	3
Координати на точката $T_i(x;y;z)$ (m)	(.0; 5.0; .0)	(9.0; 10.0; .0)	(18.0; 5.0; .0)
Координати на светилката $S_j(x;y;z)$ (m)	(-36.0; 1.2; 10.)	(.0; 1.2; 10.)	(36.0; 1.2; 10.)
Тип на светилките	CM216-2400/1 CM216-2400/2 CM216-2400/3 CM206-2250	Моќност на сијалиците (W)	400 400 400 250



$$E_i = \sum_{j=1}^3 E_{iS_j} = \sum_{j=1}^3 \frac{I_{S_j-T_i} \cdot \cos \beta_{ji}}{S_j T_i^2} \Rightarrow E_i = f \cdot \frac{2 \cdot \Phi_{\text{свј.}}}{1000 \cdot h^2} \sum_{j=1}^3 I'_{S_j-T_i} \cdot \cos^3 \beta_{ji}$$

2004 I-1

$$\beta_{ji} = \gamma_{ji} = \arctan \frac{\sqrt{(x_{S_j} - x_{T_i})^2 + (y_{S_j} - y_{T_i})^2}}{z_{S_j} - z_{T_i}}$$

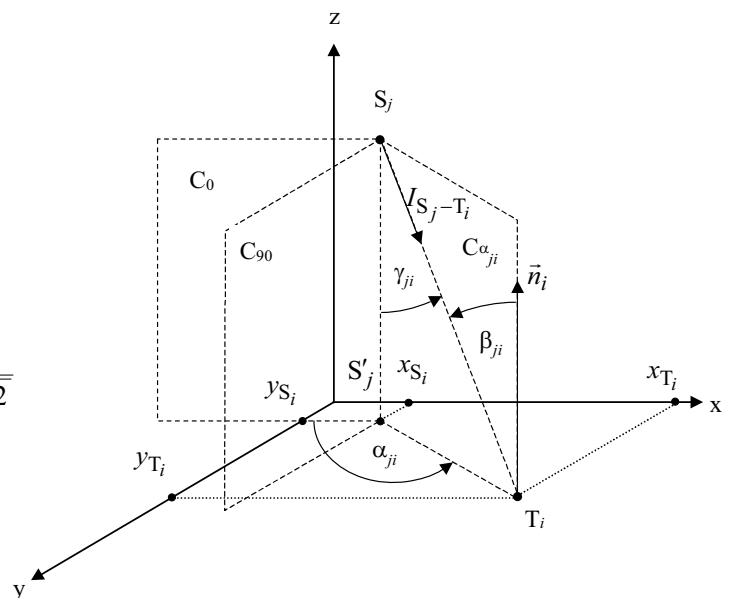
$$= \arctan \frac{\sqrt{(x_{S_j} - x_{T_i})^2 + (y_{S_j} - y_{T_i})^2}}{h}$$

$$\alpha_{ji} = 180^\circ - \arccos \frac{-(x_{S_j} - x_{T_i})}{\sqrt{(x_{S_j} - x_{T_i})^2 + (y_{S_j} - y_{T_i})^2}}$$

$$\beta_{12} = \gamma_{12} = \arctan \frac{\sqrt{(x_{S_1} - x_{T_2})^2 + (y_{S_1} - y_{T_2})^2}}{h}$$

$$= \arctan \frac{\sqrt{(-36 - 9)^2 + (1.2 - 10)^2}}{10} = \arctan \frac{45.85}{10} = 78^\circ$$

$$\alpha_{12} = 180 - \arccos \frac{-(-45)}{45.85} = 180 - 11 = 169^\circ$$



$$I'_{S_j-T_i} = I'(\alpha_{ji}; \gamma_{ji}) = I'(\alpha_1; \gamma_{ji}) + \frac{I'(\alpha_2; \gamma_{ji}) - I'(\alpha_1; \gamma_{ji})}{\alpha_2 - \alpha_1} \cdot (\alpha_{ji} - \alpha_1)$$

2004 I-2

Светилка	α_1	α_2	$I'(\alpha_{ji}; \gamma_{ji})$ (cd/klm)
CM216-2400/1	160	180	$I'(169;78) = I'(160;78) + \frac{I'(180;78) - I'(160;78)}{180 - 160} \cdot (169 - 160)$ $= 170 + \frac{110 - 170}{20} \cdot 9 = 143$
CM216-2400/2	90	170	$I'(169;78) = I'(90;78) + \frac{I'(170;78) - I'(90;78)}{170 - 90} \cdot (169 - 90)$ $= 48 + \frac{152 - 48}{80} \cdot 79 = 151$
CM216-2400/3	150	180	$I'(169;78) = I'(150;78) + \frac{I'(180;78) - I'(150;78)}{180 - 150} \cdot (169 - 150)$ $= 185 + \frac{45 - 185}{30} \cdot 19 = 96$
CM206-2250	150	180	$I'(169;78) = I'(150;78) + \frac{I'(180;78) - I'(150;78)}{180 - 150} \cdot (169 - 150)$ $= 105 + \frac{50 - 105}{30} \cdot 19 = 70$

$$I(\alpha; \gamma) = I(180 - \alpha; \gamma)$$

2004 I-3

S_j	T_i	α_{ji}	γ_{ji}	$I'(\alpha_{ji}; \gamma_{ji})$ (cd/klm)			
				CM216-2400/1	CM216-2400/2	CM216-2400/3	CM206-2250
1	1	174	75	161	184	108	93
2		90	21	207	196	225	171
3		6	75	161	184	108	93
1	2	169	78	143	151	96	70
2		136	52	226	223	241	228
3		18	71	244	238	201	158
1	3	176	80	104	96	39	37
2		168	61	270	306	217	216
3		12	61	270	306	217	216

$$E_1 = f \cdot \frac{\Phi_{\text{свет.}}}{1000 \cdot h^2} \left[I'(\alpha_{11}; \gamma_{11}) \cdot \cos^3 \beta_{11} + I'(\alpha_{21}; \gamma_{21}) \cdot \cos^3 \beta_{21} + I'(\alpha_{31}; \gamma_{31}) \cdot \cos^3 \beta_{31} \right]$$

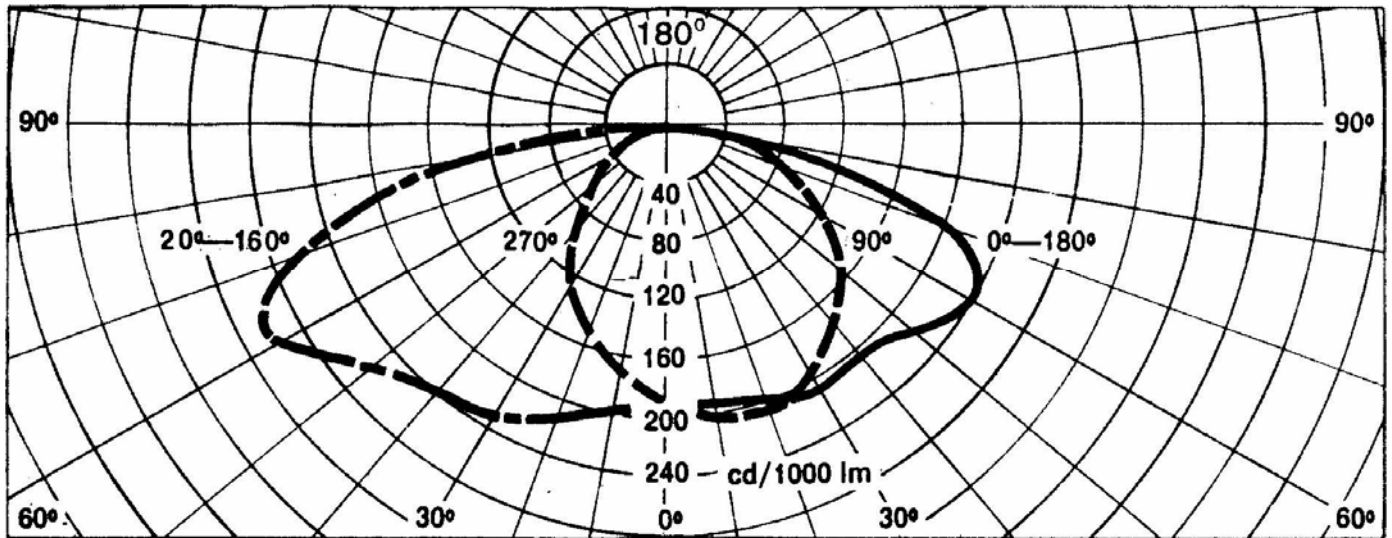
$$E_1 = 0.7 \frac{46000}{1000 \cdot 10^2} \left[2 \cdot 161 \cdot \cos^3 75 + 207 \cdot \cos^3 21 \right] = 55 \text{ lx}$$

$$E_2 = 0.7 \frac{46000}{1000 \cdot 10^2} \left[143 \cdot \cos^3 78 + 226 \cdot \cos^3 52 + 244 \cdot \cos^3 71 \right] = 20 \text{ lx}$$

$$E_3 = 0.7 \frac{46000}{1000 \cdot 10^2} \left[104 \cdot \cos^3 80 + 2 \cdot 270 \cdot \cos^3 61 \right] = 20 \text{ lx}$$

T_i	E_i (lx)			
	CM216-2400/1	CM216-2400/2	CM216-2400/3	CM206-2250
1	55	53	60	26
2	20	20	21	11
3	20	23	16	9

2004 I-4



CM 216-2400/1
 l_{\max} leži v polravnini C_{20}
 A = 55, B = 50

2004 I-5

б) Пресметка со изолуксен дијаграм

$$E_i = \frac{f \cdot \Phi_{\text{свет.}}}{1000 \cdot h^2} \sum_{j=1}^3 E'_{iS_j} = \frac{f \cdot \Phi_{\text{свет.}}}{1000 \cdot h^2} \sum_{j=1}^3 E'_{iS_j}(x'_{S_j}; y'_{S_j})$$

$$T_{1S_1}(x'_{1S_1}; y'_{1S_1}) = T_{1S_1} \left(\frac{x_{T_1} - x_{S_1}}{h} H; \frac{y_{T_1} - y_{S_1}}{h} H \right) = T_{1S_1} \left(\frac{0 + 36}{10} H; \frac{5.0 - 1.2}{10} H \right) = T_{1S_1}(3.60H; 0.38H)$$

$$T_{1S_2}(x'_{1S_2}; y'_{1S_2}) = T_{1S_2} \left(\frac{x_{T_1} - x_{S_2}}{h} H; \frac{y_{T_1} - y_{S_2}}{h} H \right) = T_{1S_2} \left(\frac{0 - 0}{10} H; \frac{5.0 - 1.2}{10} H \right) = T_{1S_2}(0.00H; 0.38H)$$

$$T_{1S_3}(x'_{1S_3}; y'_{1S_3}) = T_{1S_3} \left(\frac{x_{T_1} - x_{S_3}}{h} H; \frac{y_{T_1} - y_{S_3}}{h} H \right) = T_{1S_3} \left(\frac{0 - 36}{10} H; \frac{5.0 - 1.2}{10} H \right) = T_{1S_3}(-3.60H; 0.38H)$$

	$T_{iS_j}(x'; y') (H; H)$		
	S_1	S_2	S_3
T_1	(3.60; 0.38)	(0.00; 0.38)	(-3.60; 0.38)
T_2	(4.50; 0.88)	(0.90; 0.88)	(-2.70; 0.88)
T_3	(5.40; 0.38)	(1.80; 0.38)	(-1.80; 0.38)

$$I(\alpha; \gamma) = I(180 - \alpha; \gamma) \Rightarrow E'_{iS_j}(x'_{S_j}; y'_{S_j}) = E'_{iS_j}(-x'_{S_j}; y'_{S_j})$$

2004 I-6

S_j	T_i	$E'_{iS_j}(x';y') (lx \cdot m^2/klm)$			
		CM216-2400/1	CM216-2400/2	CM216-2400/3	CM206-2250
1	1	3.8	3.5	2.1	1.6
2		160	160	182	145
3		3.8	3.5	2.1	1.6
1	2	1.5	1.3	1.2	0.7
2		47	60	58	48
3		9.5	8	10	7.5
1	3	0.5	0.55	0.3	0.3
2		34	35	27	28
3		34	35	27	28

Изолуксен дијаграм

T_i	$E_i (lx)$			
	CM216-2400/1	CM216-2400/2	CM216-2400/3	CM206-2250
1	54	54	60	27
2	19	22	22	10
3	22	23	17	10

Дијаграм за распределба на светлинската јачина

T_i	$E_i (lx)$			
	CM216-2400/1	CM216-2400/2	CM216-2400/3	CM206-2250
1	55	53	60	26
2	20	20	21	11
3	20	23	16	9