

**SVEUČILIŠTE U ZAGREBU  
GEODETSKI FAKULTET  
ZAVOD ZA PRIMIJENJENU GEODEZIJU  
TERENSKA MJERENJA**

## **PRESJEK UNUTARNJIH VIZURA**

**JOSIPA HUMSKI**

Datum i sat	Stajalište Girus	Vizurna točka	I Položaj durbina			II Položaj durbina			Sredina iz I i II	Reducirana sredina			Dvostruka kolimacijska pogreška 2C=II-I		KONTROLE				PRIMJEDBE		
			°	'	"	°	'	"		°	'	"			±	"	'	"		'	"
1	2	3	4			5			6	7			8		9				10		
10.03.2020.	T	F	0	00	00	190	00	01	0	00	00	+	01	I. kontrola				<u>Instrument:</u>			
08:10h	I	A	50	54	10	230	54	15	50	54	13	+	05			46'	15"	TOPCON			
		D	135	52	05	315	52	02	135	52	04	-	03			+	46'	18"	GTS -105N		
			Σ	46	15		46	18		46	17					Σ	32'	33"			
																32'	33"	/	2		
																=	46'	17"	<u>Opažai:</u>		
																			Gudelj Andrija		
																			Hodak Luka		
																			Horak Lorena		
																	00'	00"	Horvatić Nikol		
																	Σ	00'	00"	Hrastnik Korina	
																	00'	00"	X	3	Humski Josipa
																	=	00'	00"		
																	00'	00"	+	46'	17"
																	=	46'	17"		

Točka	Y	X
A	5575344.09	5074293.31
D	5575437.67	5074248.73
F	5575338.69	5074226.72

Geodetski fakultet  
Zavod za primijenjenu geodeziju

str. 1

$T_B$ $T_A$	$y_B$ $y_A$ $\Delta y = y_B - y_A$ $\Delta x + \Delta y$	$x_B$ $x_A$ $\Delta x = x_B - x_A$ $\Delta x - \Delta y$	$\text{tg } v_A^B = \frac{\Delta y}{\Delta x}$  $v_A^B$			$\text{tg}(v_A^B + 45^\circ) = \frac{\Delta x + \Delta y}{\Delta x - \Delta y}$  $v_A^B + 45^\circ$			$\sin v_A^B$ $\cos v_A^B$  $d = \Delta y / \sin v_A^B$ $d = \Delta x / \cos v_A^B$	Kvadrant
1	2	3	4			5			6	7
D	5575437.67	5074248.73							0.902792745	
A	5575344.09	5074293.31	-2.0991476			-0.354661262			-0.430077837	
	93.58	-44.58	115	28	21	160	28	21	103.656	
	49.00	-138.16							103.656	Drugi kvadrant
F	5575338.69	5074226.72							-0.080827926	
A	5575344.09	5074293.31	0.081093257			1.176499428			-0.99672807	
	-5.40	-66.59	184	38	10	229	38	10	66.809	
	-71.99	-61.19							66.809	Treći kvadrant
F	5575338.69	5074226.72							-0.976156884	
D	5575437.67	5074248.73	4.497046797			-1.571911134			-0.217066206	
	-98.98	-22.01	257	27	48	302	27	48	101.398	
	-120.99	76.97							101.398	Treći kvadrant

**a) Snellius<sup>2</sup>-Pothenotova<sup>3</sup> metoda**

**Zadane vrijednosti:**

Koordinate točaka stajališta: A( $Y_A, X_A$ ), D( $Y_D, X_D$ ) i F( $Y_F, X_F$ )

Točka	Y	X
A	5575344.09	5074293.31
D	5575437.67	5074248.73
F	5575338.69	5074226.72

**Mjerene vrijednosti:**

Kutovi  $\alpha$  i  $\beta$  na traženoj točki T( $Y_T, X_T$ )

$$\alpha = 50^\circ 54' 13''$$

$$\beta = 84^\circ 57' 51''$$

**Tražena vrijednost:**

Izračunati koordinate točke T( $Y_T, X_T$ )

$$v_{FA} = 4^\circ 38' 10''$$

$$v_{DA} = 295^\circ 28' 21''$$

$$v_{AF} = v_{FA} + 180^\circ$$

$$v_{AD} = v_{DA} - 180^\circ$$

$$v_{AF} = 184^\circ 38' 10''$$

$$v_{AD} = 115^\circ 28' 21''$$

$$a = \sqrt{(Y_A - Y_F)^2 + (X_A - X_F)^2}$$

$$b = \sqrt{(Y_A - Y_D)^2 + (X_A - X_D)^2}$$

$$a = 66.809 \text{ m}$$

$$b = 103.656 \text{ m}$$

$$\alpha + \beta + \gamma + \delta + \varphi + \psi = 360^\circ$$

$$\varphi + \psi = 360^\circ - (\alpha + \beta + \gamma + \delta)$$

$$\gamma + \delta = v_{AF} - v_{AD} = 69^\circ 09' 49''$$

$$\frac{\varphi + \psi}{2} = 180 - \frac{\alpha + \beta + \gamma + \delta}{2}$$

$$\varphi + \psi = 154^{\circ} 58' 07''$$

### Trokut FTA

$$\frac{d_A}{\sin \varphi} = \frac{a}{\sin \alpha}$$

$$d_A = \frac{a}{\sin \alpha} \cdot \sin \varphi$$

### Trokut ADT

$$\frac{d_D}{\sin \psi} = \frac{b}{\sin \beta}$$

$$d_D = \frac{b}{\sin \beta} \cdot \sin \psi$$

$$\frac{a}{\sin \alpha} \cdot \sin \varphi = \frac{b}{\sin \beta} \cdot \sin \psi$$

$$\frac{\sin \psi}{\sin \varphi} = \frac{a \cdot \sin \beta}{b \cdot \sin \alpha} = \operatorname{tg} \mu$$

$$\operatorname{tg} \mu = 0.8272770328$$

$$\mu = 39^{\circ} 36' 01''$$

$$\operatorname{ctg} \frac{\varphi + \psi}{2} \cdot \operatorname{tg} \frac{\varphi - \psi}{2} = \operatorname{ctg}(45 + \mu)$$

$$\frac{\varphi - \psi}{2} = \operatorname{arctg} \left[ \operatorname{tg} \frac{\varphi + \psi}{2} \cdot \operatorname{ctg} (45 + \mu) \right]$$

$$\frac{\varphi - \psi}{2} = 23^{\circ} 03' 54''$$

$$\varphi = \frac{\varphi + \psi}{2} + \frac{\varphi - \psi}{2} = 100^{\circ} 32' 58''$$

$$\psi = \frac{\varphi + \psi}{2} - \frac{\varphi - \psi}{2} = 54^{\circ} 25' 09''$$

**Kontrola**  $\alpha+\beta+\gamma+\delta+\varphi+\psi=360^\circ$

$$50^\circ54'13''+84^\circ57'51''+28^\circ32'49''+40^\circ37'00''+100^\circ32'58''+54^\circ25'09'' = 360^\circ00'00''$$

$$v_F^T = v_F^A + \varphi$$

$$v_D^T = v_D^A - \psi$$

$$v_F^T = 105^\circ11'08''$$

$$v_D^T = 241^\circ03'12''$$

**Trokut FTA**

$$d_F = \frac{a}{\sin \alpha} \cdot \sin \gamma$$

$$d_F = 41.14 \text{ m}$$

**Trokut ADT**

$$d_D = \frac{a}{\sin \beta} \cdot \sin \delta$$

$$d_D = 67.741 \text{ m}$$

$$\gamma = 180^\circ - \alpha - \varphi$$

$$\gamma = 28^\circ32'49''$$

$$\delta = 180^\circ - \beta - \psi$$

$$\delta = 40^\circ37'00''$$

$$\Delta Y_F^T = d_F \sin v_F^T = 39.702 \text{ m}$$

$$\Delta X_F^T = d_F \cos v_F^T = -10.776 \text{ m}$$

$$\Delta Y_D^T = d_D \sin v_D^T = -59.278 \text{ m}$$

$$\Delta X_D^T = d_D \cos v_D^T = -32.786 \text{ m}$$

$$Y_F^T = Y_F + \Delta Y_F^T = 5575378.393$$

$$X_F^T = X_F + \Delta X_F^T = 5074215.944$$

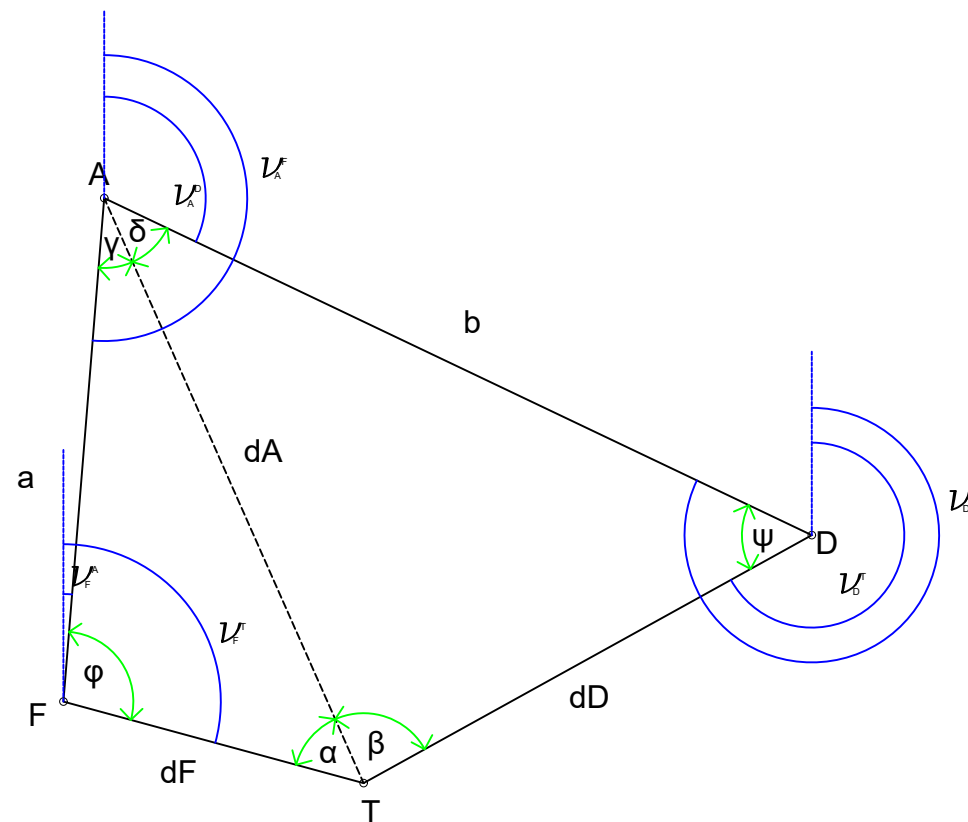
$$Y_D^T = Y_D + \Delta Y_D^T = 5575378.393$$

$$X_D^T = X_D + \Delta X_D^T = 5074215.944$$

**Konačne koordinate točke T:**

Točka	Y	X
T	5575378.39	5074215.94

# SKICA PRESJEKA UNUTARNJIH VIZURA SNELLIUS-POTHENOTOVA METODA M 1:1000



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**b) Metoda pomoću Collinsove<sup>4</sup> pomoćne točke C**

**Zadane vrijednosti:**

Koordinate točaka stajališta: A( $Y_A, X_A$ ), D( $Y_D, X_D$ ) i F( $Y_F, X_F$ )

Točka	Y	X
A	5575344.09	5074293.31
D	5575437.67	5074248.73
F	5575338.69	5074226.72

**Mjerene vrijednosti:**

Kutovi  $\alpha$  i  $\beta$  na traženoj točki T( $Y_T, X_T$ )

$$\alpha = 50^\circ 54' 13''$$

$$\beta = 84^\circ 57' 51''$$

**Tražena vrijednost:**

Izračunati koordinate točke T( $Y_T, X_T$ )

$$v_{FD} = 77^\circ 27' 48''$$

$$v_{DF} = v_{FD} + 180^\circ$$

$$v_{DF} = 257^\circ 27' 48''$$

$$v_{FC} = v_{FD} - \beta$$

$$v_{FC} = 352^\circ 29' 57''$$

$$v_{DC} = v_{DF} + \alpha$$

$$v_{DC} = 308^\circ 22' 01''$$

$$d = \sqrt{(Y_D - Y_F)^2 + (X_D - X_F)^2}$$

$$d = 101.398 \text{ m}$$



**Trokut FCD**

$$a = \frac{d}{\sin(\alpha + \beta)} \cdot \sin \alpha$$

$$b = \frac{d}{\sin(\alpha + \beta)} \cdot \sin \beta$$

$$a = 113.014 \text{ m}$$

$$b = 145.058 \text{ m}$$

**Koordinate Collinsove pomoćne točke C(Y<sub>C</sub>,X<sub>C</sub>)**

$$\Delta Y_{FC} = a \sin v_{FC} = -14.7529 \text{ m}$$

$$\Delta X_{FC} = a \cos v_{FC} = 112.0469 \text{ m}$$

$$\Delta Y_{DC} = b \sin v_{DC} = -113.7329 \text{ m}$$

$$\Delta X_{DC} = b \cos v_{DC} = 90.0369 \text{ m}$$

$$Y_{FC} = Y_F + \Delta Y_{FC} = 5575323.937$$

$$X_{FC} = X_F + \Delta X_{FC} = 5074338.767$$

$$Y_{DC} = Y_D + \Delta Y_{DC} = 5575323.937$$

$$X_{DC} = X_D + \Delta X_{DC} = 5074338.767$$

**Konačne koordinate točke C:**

Točka	Y	X
C	5575323.94	5074338.77

$$V_C^A = v_C^T = 156^\circ 05' 41''$$

$$\delta_a = v_C^F - v_C^T$$

$$\delta_a = 16^\circ 24' 16''$$

$$\delta_b = v_C^T - v_C^D$$

$$\delta_b = 27^\circ 43' 40''$$

$$v_F^T = v_F^D + \delta_b$$

$$v_E^T = v_D^F - \delta_a$$

$$v_F^M = 105^\circ 11' 28''$$

$$v_E^M = 241^\circ 03' 32''$$

### Trokut FTD

$$d_a = \frac{d}{\sin(\alpha + \beta)} \cdot \sin\delta_a$$

$$d_a = 41.122 \text{ m}$$

$$d_b = \frac{d}{\sin(\alpha + \beta)} \cdot \sin\delta_b$$

$$d_b = 67.75 \text{ m}$$

$$\Delta Y_{F^T} = d_F \sin v_{F^T} = -39.71 \text{ m}$$

$$\Delta X_{F^T} = d_F \cos v_{F^T} = -10.77 \text{ m}$$

$$\Delta Y_{D^T} = d_D \sin v_{D^T} = 59.27 \text{ m}$$

$$\Delta X_{D^T} = d_D \cos v_{D^T} = -32.78 \text{ m}$$

$$Y_{F^T} = Y_F + \Delta Y_{F^T} = 5575378.38$$

$$X_{F^T} = X_F + \Delta X_{F^T} = 5074215.94$$

$$Y_{D^T} = Y_D + \Delta Y_{D^T} = 5575378.38$$

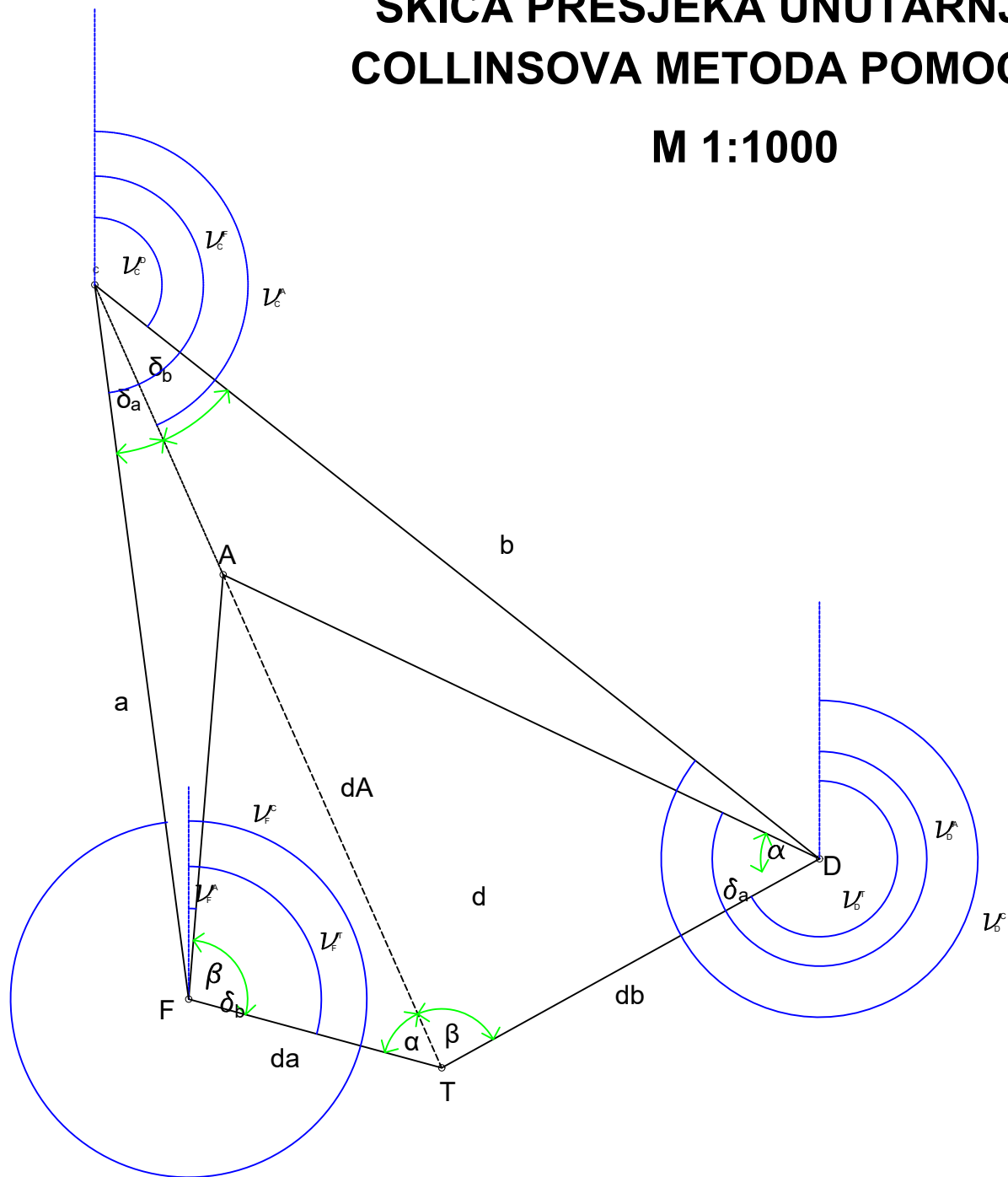
$$X_{D^T} = X_D + \Delta X_{D^T} = 5074215.94$$

### Konačne koordinate točke T:

Točka	Y	X
T	5575378.38	5074215.94

# SKICA PRESJEKA UNUTARNJIH VIZURA COLLINSOVA METODA POMOĆU TOČKE C

M 1:1000



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