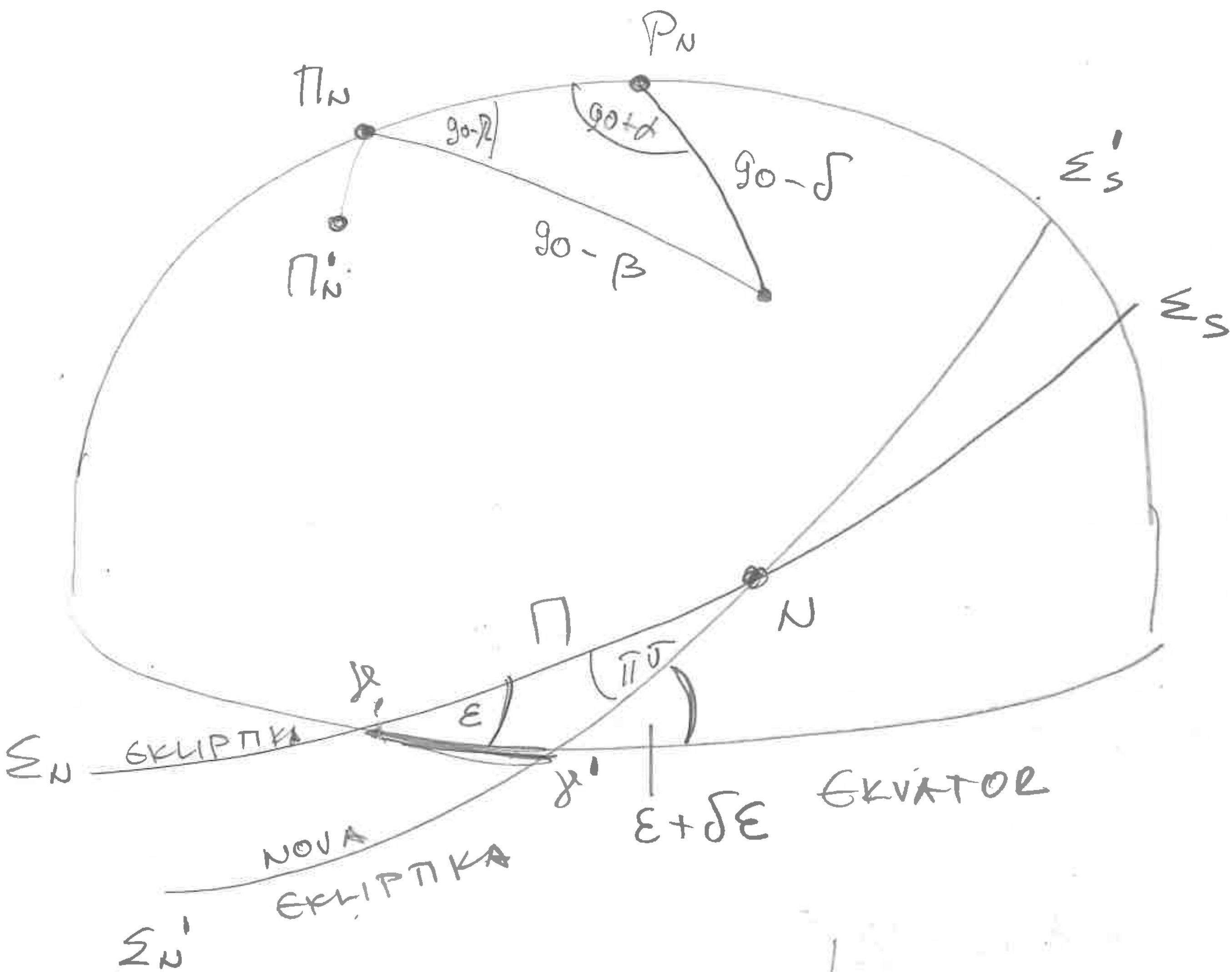
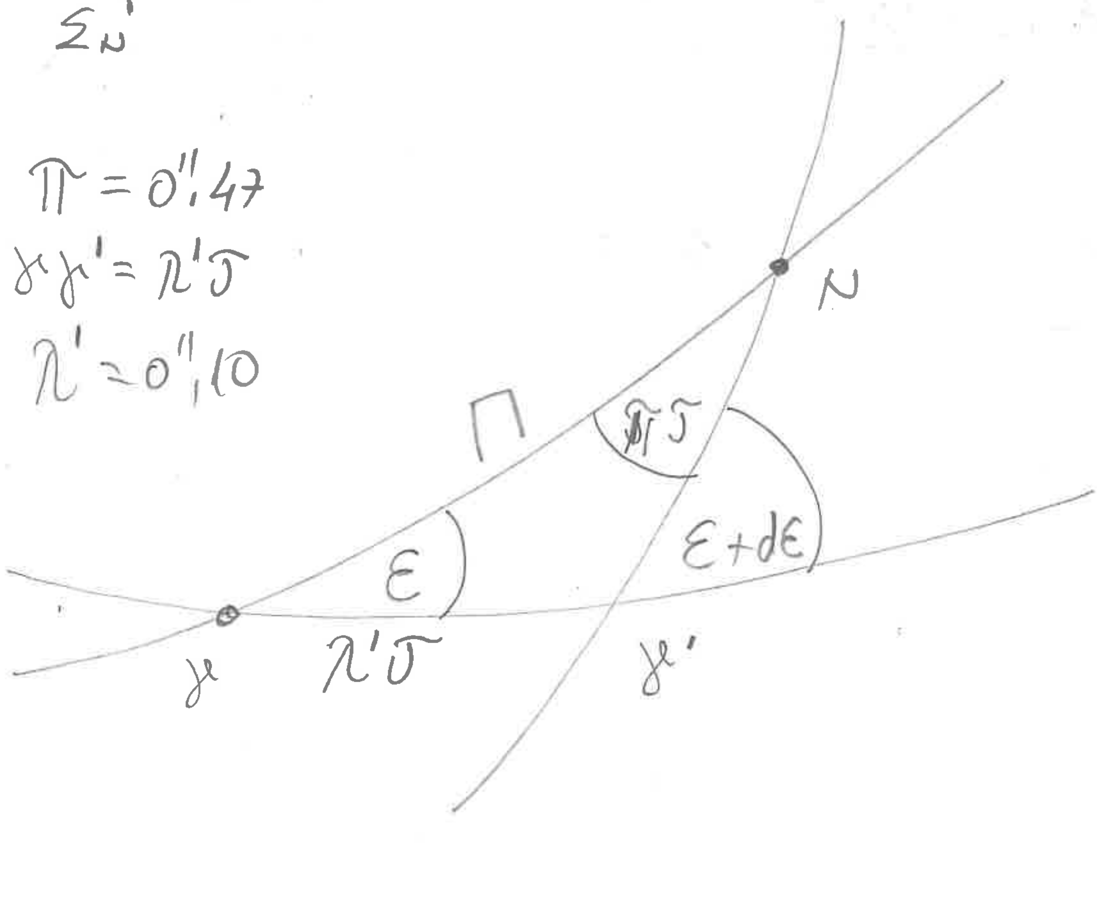
PLANETSKA PRECESIJA



$\Pi = 0'',47$

$\gamma\gamma' = \lambda'\sigma$

$\lambda' = 0'',10$



UTICAJ PLANETSKE PRECESIJE NA EKVATORSKE KOORDINATE

$$d\alpha = -\lambda'\vartheta$$
$$d\delta = 0$$

UTICAJ PLANETSKE PRECESIJE NA EKLIPTIČKE KOORDINATE

$\triangle\ \gamma\gamma' N$

SINOSNI OBRAZAC

$$\sin \Pi \ \sin \pi\vartheta = \sin(180 - (\varepsilon + d\varepsilon)) \cdot \sin \lambda'\vartheta$$

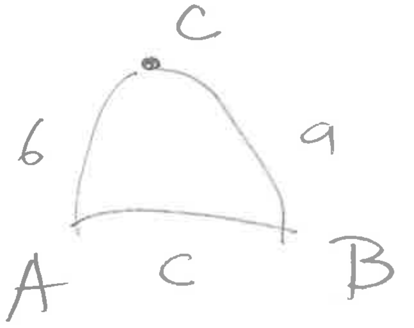
$$\sin \Pi \ \underbrace{\sin \pi\vartheta}_{\approx \pi\vartheta} = \underbrace{\sin(\varepsilon + d\varepsilon)}_{\approx \sin\varepsilon} \cdot \underbrace{\sin \lambda'\vartheta}_{\approx \lambda'\vartheta}$$

$$\pi\cancel{\vartheta} \sin \Pi = \lambda'\cancel{\vartheta} \sin \varepsilon$$

$$\boxed{\lambda' = \pi \sin \Pi \ \mathrm{cosec}\, \varepsilon}$$

ČETVORO - ELEMENTNI OBRAZAC

$$\cos a \cos C = \sin a \,\mathrm{ctg}\, b - \sin C \,\mathrm{ctg}\, B$$



$$\cos \lambda'\sigma \cos \varepsilon = \sin \lambda'\sigma \,\mathrm{ctg}\, \Pi - \sin \varepsilon \,\mathrm{ctg}\,(180 - (\varepsilon + d\varepsilon))$$

$$\cos \lambda'\sigma \cos \varepsilon = \sin \lambda'\sigma \,\mathrm{ctg}\, \Pi + \sin \varepsilon \,\mathrm{ctg}\,(\varepsilon + d\varepsilon) \;/\cdot \sin(\varepsilon + d\varepsilon)$$

$$\sin(\varepsilon + d\varepsilon) \underbrace{\cos \lambda'\sigma}_{\approx 1} \cos \varepsilon - \sin \varepsilon \cos(\varepsilon + d\varepsilon) = \underbrace{\sin \lambda'\sigma}_{\lambda'\sigma} \,\mathrm{ctg}\, \Pi \cdot \underbrace{\sin(\varepsilon + d\varepsilon)}_{\approx \sin \varepsilon}$$

$$\sin(\varepsilon + d\varepsilon) \cos \varepsilon - \cos(\varepsilon + d\varepsilon) \sin \varepsilon = \lambda'\sigma \,\mathrm{ctg}\, \Pi \sin \varepsilon$$

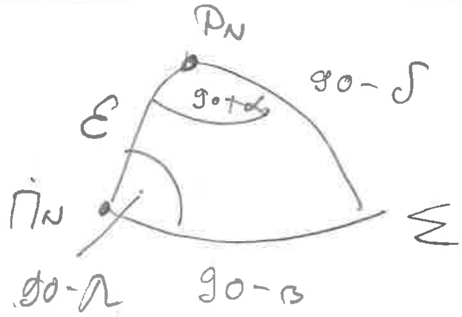
$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\sin(\varepsilon + d\varepsilon - \varepsilon) = \lambda'\sigma \,\mathrm{ctg}\, \Pi \sin \varepsilon$$

$$\sin d\varepsilon = \lambda'\sigma \,\mathrm{ctg}\, \Pi \sin \varepsilon$$

$$\boxed{d\varepsilon = \lambda'\sigma \,\mathrm{ctg}\, \Pi \sin \varepsilon}$$

$\triangle\, P_N \Pi_N \Sigma$



KOSINUSNI OBRAZAC

$$\cos(90-\beta) = \cos\varepsilon\cos(90-\delta) + \sin\varepsilon\sin(90-\delta)\cos(90+\alpha)$$

$$\sin\beta = \cos\varepsilon\sin\delta - \sin\varepsilon\cos\delta\sin\alpha$$

DIFERENCIRAMO OVAJ IZRAZ UZIMAJUĆI U OBZIR DA JE $\beta \neq const$, $\varepsilon \neq const$, $\alpha \neq const$, $\delta = const$.

$$\cos\beta\, d\beta = -\sin\varepsilon\sin\delta\, d\varepsilon - \cos\varepsilon\cos\delta\sin\alpha\, d\varepsilon - \sin\varepsilon\cos\delta\cos\alpha\, d\alpha$$

$$\cos\beta\, d\beta = -\underline{(\sin\varepsilon\sin\delta + \cos\varepsilon\cos\delta\sin\alpha)}\, d\varepsilon - \sin\varepsilon\cos\delta\cos\alpha\, d\alpha \qquad (6)$$

SINUSNO - KOSINUSNI OBRAZAC

$$\sin(90-\beta)\cos(90-\lambda) = \cos(90-\delta)\sin\varepsilon - \sin(90-\delta)\cos\varepsilon\cos(90+\alpha)$$

$$\cos\beta\sin\lambda = \underline{\sin\delta\sin\varepsilon + \cos\delta\cos\varepsilon\sin\alpha}. \qquad (7)$$

SINUSNI OBRAZAC

$$\sin(90-\beta)\sin(90-\lambda) = \sin(90-\delta)\sin(90+\alpha)$$

$$\cos\beta\cos\lambda = \cos\delta\cos\alpha \qquad (8)$$

$$(7)(8) \longrightarrow (6)$$

$$\cancel{\cos\beta}\, d\beta = -\cancel{\cos\beta}\sin\lambda\, d\varepsilon - \sin\varepsilon\cancel{\cos\beta}\cos\lambda\, d\alpha$$

$$d\beta = -\sin\lambda\, d\varepsilon - \sin\varepsilon\cos\lambda\, d\alpha$$

$$d\beta = -\sin\lambda \underbrace{\lambda'\sigma\sin\varepsilon\,\mathrm{ctg}\,\Pi}_{d\varepsilon} + \cancel{\sin\varepsilon}\cos\lambda\,\underbrace{\Pi\sigma\sin\Pi\cancel{\mathrm{cosec}\,\varepsilon}}$$

$d\alpha = -\lambda'\sigma = -\Pi\sigma\sin\Pi\,\mathrm{cosec}\,\varepsilon$

$$d\beta = -\sin\lambda\cancel{\sin\varepsilon}\,\mathrm{ctg}\,\Pi\cdot\underbrace{\Pi\sigma\sin\Pi\cancel{\mathrm{cosec}\,\varepsilon}}_{\lambda'\sigma} + \Pi\sigma\cos\lambda\sin\Pi$$

$$d\beta = -\sin\lambda\,\Pi\sigma\cos\Pi + \Pi\sigma\cos\lambda\sin\Pi$$

$$d\beta = -\Pi\sigma(\sin\lambda\cos\Pi - \cos\lambda\sin\Pi)$$

$$d\beta = \Pi\sigma(\sin\Pi\cos\lambda - \cos\Pi\sin\lambda)$$

$$\boxed{d\beta = \Pi\sigma\sin(\Pi-\lambda)}$$

SINUSNI OBRAZAC

$$\sin(90-\beta)\sin(90-\lambda)=\sin(90-\delta)\sin(90+\alpha)$$

$$\cos\beta\cos\lambda=\cos\delta\cos\alpha \qquad \left(\begin{array}{c}\text{DIFERENCIRAMO}\\ \delta=\text{CONST}\end{array}\right)$$

$$-\sin\beta\cos\lambda\, d\beta-\cos\beta\sin\lambda\, d\lambda=-\cos\delta\sin\alpha\, d\alpha$$

$$\cos\beta\sin\lambda\, d\lambda=\underline{\cos\delta\sin\alpha\, d\alpha}-\sin\beta\cos\lambda\, d\beta \quad (9)$$

SINUSNO - KOSINUSNI OBRAZAC

$$\sin(90-\delta)\cos(90+\alpha)=\cos(90-\beta)\sin\varepsilon-\sin(90-\beta)\cos\varepsilon\cos(90-\lambda)$$

$$-\cos\delta\sin\alpha=\sin\beta\sin\varepsilon-\cos\beta\cos\varepsilon\sin\lambda$$

$$\underline{\cos\delta\sin\alpha}=-\sin\beta\sin\varepsilon+\cos\beta\cos\varepsilon\sin\lambda \quad (10)$$

$$(10)\longrightarrow(9)$$

$$\cos\beta\sin\lambda\, d\lambda=-(\sin\beta\sin\varepsilon-\cos\beta\cos\varepsilon\sin\lambda)\, d\lambda$$
$$-\sin\beta\cos\lambda\, d\beta$$

$$d\alpha=-\lambda'\delta=-\Pi\delta\frac{\sin\Pi}{\sin\varepsilon}$$

$$\cos\beta\sin\lambda\, d\lambda=-(\sin\beta\sin\varepsilon-\cos\beta\cos\varepsilon\sin\lambda)\cdot\underbrace{\left(-\Pi\delta\frac{\sin\Pi}{\sin\varepsilon}\right)}_{d\alpha}$$
$$-\sin\beta\cos\lambda\,\Pi\,\delta\sin(\Pi-\lambda)\, d\beta$$

$$\cos\beta \sin\lambda \, d\lambda = \Pi \sigma \big[\sin\beta \sin\Pi - \cos\beta \sin\lambda \,\mathrm{ctg}\,\varepsilon \cdot \sin\Pi$$

$$- \sin\beta \cos^2\lambda \sin\Pi + \sin\beta \cos\lambda \cos\Pi \sin\lambda \big]$$

$$\cos\beta \sin\lambda \, d\lambda = \Pi\sigma \big[\sin\beta \sin\Pi \overbrace{(1-\cos^2\lambda)}^{\sin^2\lambda} - \cos\beta \sin\lambda \,\mathrm{ctg}\,\varepsilon \sin\Pi$$

$$+ \sin\beta \cos\lambda \cos\Pi \sin\lambda \big] \Big/ \cos\beta \sin\lambda$$

$$d\lambda = \Pi\sigma \big[\mathrm{tg}\,\beta \sin\Pi \sin\lambda - \mathrm{ctg}\,\varepsilon \sin\Pi + \mathrm{tg}\,\beta \cos\lambda \cos\Pi \big]$$

$$d\lambda = \Pi\sigma \big[\mathrm{tg}\,\beta \underbrace{(\sin\Pi \sin\lambda + \cos\Pi \cos\lambda)}_{\cos(\Pi-\lambda)} - \mathrm{ctg}\,\varepsilon \sin\Pi \big]$$

$$d\lambda = -\underbrace{\left(\Pi\sigma \frac{\cos\varepsilon}{\sin\varepsilon} \sin\Pi\right)}_{\lambda'\sigma} + \Pi\sigma \,\mathrm{tg}\,\beta \cos(\Pi-\lambda)$$

$$\boxed{d\lambda = -\lambda'\sigma \cos\varepsilon + \Pi\sigma \,\mathrm{tg}\,\beta \cos(\Pi-\lambda)}$$