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Дано:

Сигнал GPS L1 C/A

$f_{if} = 8{,}54$ МГц

$F_d = 99{,}375$ МГц

$q = 2717 = 34$ дБГц

$T = 1$ мс

$f_d = 700$ Гц

$f_{d,rep} = f_d$

$\tau = \tau_{rep}$

Построить на I, Q вид множества точек корреляционной суммы

Решение

$$A_{IQ} = A_{IQ}(\delta\tau, \delta\omega, q)$$

$$A_{IQ}(\delta\tau_k, \delta\omega_k) = \frac{A_k L}{2}\left(\rho(\delta\tau_k) \cdot \operatorname{sinc}\left(\frac{\delta\omega_k T}{2}\right)\right)$$

$$L = F_d / T = 99375$$

$$f_{d,rep} = f_d \Rightarrow \delta\omega_k = 0$$

$$\operatorname{sinc}(x) = \begin{cases} \dfrac{\sin(\pi x)}{\pi x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$$

$$\Rightarrow \operatorname{sinc}\left(\frac{\delta\omega_k T}{2}\right) = \operatorname{sinc}(0) = 1$$

$$\tau = \tau_{rep} \Rightarrow \delta\tau_k = 0$$

$$\rho(\delta\tau_k = 0) = 1 \quad - \text{GPS } L_1 \text{ C/A}$$

$$A_{IQ} = \frac{A_k L}{2} = \sigma_{IQ}\sqrt{2qT}$$

Пусть $\sigma_n = 10$

$$q_{c/N_0} = \frac{A_k^2}{4 T_d \sigma_n^2} \Rightarrow A_k = 2\sigma_n\sqrt{q \cdot \frac{1}{F_d}}$$

$$q_{c/N_0} = 10^{\frac{q,\ \text{дБГц}}{10}} = 10^{\frac{34}{10}} = 10^{3{,}4} = 2{,}512 \cdot 10^3$$

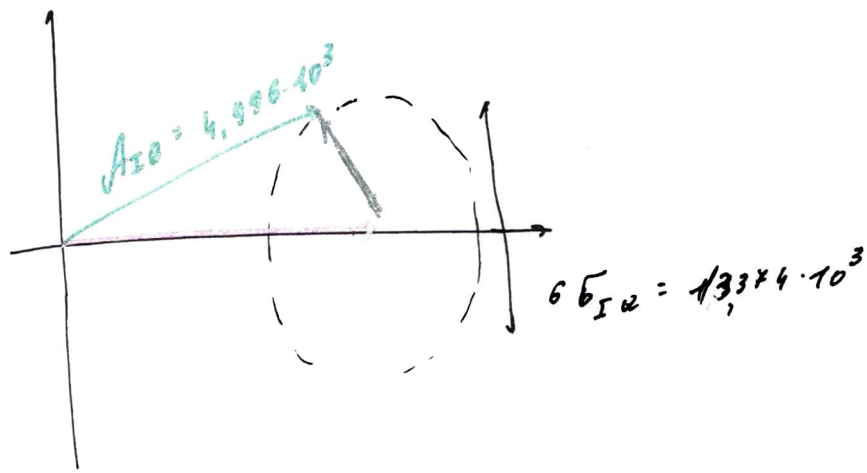
$$A_k = 2 \cdot 10\sqrt{2{,}512 \cdot 10^3 \cdot \frac{1}{99{,}375 \cdot 10^6}} = 0{,}101$$

$$A_{I\omega} = \frac{0{,}101 \cdot 99376}{2} = 4{,}996 \cdot 10^{3}$$

$$\sigma_{I\omega} = \sigma_M \sqrt{\frac{L}{2}} = 10 \sqrt{\frac{99375}{2}} = 2{,}228 \cdot 10^{3}$$

Зона $\delta\sigma_{I\omega} = 13{,}374 \cdot 10^{3}$

Знак поворота $\overline{\delta\varphi_\omega} = \frac{\delta\omega_\omega I}{2}$ ($=0$) $+ \delta\varphi_\omega$ ($=0$)



- $\overline{I} + j\overline{\omega}$
- $I + j\omega$
- $n_I + j n_\omega$