











$$\sigma = \frac{\text{NEFD} \exp(A \tau_{\text{zen}})}{\sqrt{t_{\sigma}}},$$



Aspirin









1. *Explain the importance of the following factors in the design of a control system:*
 a. *Stability*
 b. *Transient response*
 c. *Steady-state error*





$$t_{cal} = n_{cal}(t_{pointing} + t_{focus} + t_{skydips} + t_{conf}),$$







cal

ood







$$n_{\text{source}} t_{\text{source}} \leq n_{\text{cal}} d_{\text{cal}} \quad i.e. \quad \epsilon_{\text{tel}} t_{\text{tel}} \leq n_{\text{cal}} (d_{\text{cal}} + t_{\text{cal}}) \quad \text{OR} \quad \frac{\epsilon_{\text{tel}} t_{\text{tel}}}{d_{\text{cal}} + t_{\text{cal}}} \leq n_{\text{cal}}.$$



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to

to

to



W

V

D

E

C

H

D

overhead
sivbsead

overboard

again





1990-2000



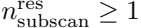


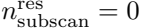
$$\text{floor} \left(\frac{n_{\text{subscan}}^{\text{tot}}}{n_{\text{subscan}}^{\text{max}}} \right),$$

1990-2000

tot max
vba vba vba









WORLD

$$2 \text{ max}(\text{subscan} + \text{overhead}, \text{overhead} + \text{subscan})$$



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$$n_{\text{scan}} t_{\text{scan}} + [n_{\text{rescan}} (t_{\text{subscan}} + t_{\text{overhead}}) + t_{\text{scan}}] \cdot$$













$\Delta_{\text{SOI}} + \Delta_{\text{array}} + \Delta_{\text{throw}} + \Delta_{\text{base}}$



airway













COVE

corvetta
airborne

$$\Omega_{\text{map}} = n_{\text{subscan}}^{\text{cover}} \delta \Delta_{\text{tot}}^{\parallel} \quad \text{with} \quad n_{\text{subscan}}^{\text{cover}} = \text{ceil} \left(\frac{\Delta_{\text{tot}}^{\perp}}{\delta} + 1 \right);$$

$$\Delta_{tot} = v_{||} t_{subscan} \text{ and } t_{cover} = n_{cover} t_{subscan};$$

WINTER IS COMING

ALDO 2012





can't do it

$\Delta edge = \Delta array + \Delta row + \Delta base$



$$\Delta \text{submap}(\Delta \text{submap} + \Delta \text{edge}) = \Delta \text{submap} \odot v.$$

$$\Delta_{\text{submap}} = \frac{\sqrt{\Delta_{\text{edge}}^2 + 4d_{\text{submap}}\delta v_{\parallel}} - \Delta_{\text{edge}}}{2}.$$

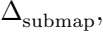




$\Delta_{\text{inv}} + \Delta_{\text{array}} + \Delta_{\text{throw}} + \Delta_{\text{base}}$







$\Delta \text{vibmap} + \Delta \text{array} + \Delta \text{brown} + \Delta \text{base}$

$$\Delta_{\parallel \text{mos}}^2 + \Delta_{\perp \text{mos}}^2$$

$$\Delta_{\text{submap}}^2$$



$$\sigma_{\text{beam}} = \frac{\text{NEFD} \exp(A \tau_{\text{zen}})}{\sqrt{t_{\text{beam}}}} \quad \text{with} \quad t_{\text{beam}} = \frac{n_{\text{cover}} t_{\text{cover}}}{n_{\text{bol}}^{\text{beam}}},$$





bold

bold

$$n_{\text{beam}}^{\text{bol}} = \frac{\Omega_{\text{map}}}{n_{\text{bol}}^{\text{tot}} \Omega_{\text{beam}}} \quad \text{with} \quad n_{\text{bol}}^{\text{tot}} = n_{\text{bol}}^{\text{max}} - n_{\text{bol}}^{\text{dead}} \quad \text{and} \quad \Omega_{\text{beam}} = \frac{\eta_{\text{grid}} \pi \theta^2}{4 \ln(2)},$$



2020





$$\sigma_{\text{beam}} = \frac{\text{NEFD}}{\sqrt{n_{\text{bol}}^{\text{tot}} \Omega_{\text{beam}}}} \exp(A \tau_{\text{zen}}) \sqrt{\frac{\delta v_{\parallel}}{n_{\text{cover}}}}.$$

$$\frac{\text{NEFD}}{\sqrt{n_{\text{bol}}^{\text{tot}}} \Omega_{\text{beam}}} \simeq 0.2 \text{ (mJy/Beam)} \sqrt{s}''.$$

$$\sigma_{\text{actual}} = a(\Delta_{\text{sou}}^{\parallel}) \exp(A \tau_{\text{zen}}) \sqrt{\frac{\delta v_{\parallel}}{n_{\text{cover}}}} \, ;$$





$$n_{\text{subscan}}^{\text{max}} (t_{\text{subscan}} + t_{\text{scan}}^{\text{overhead}}) + t_{\text{scan}}^{\text{overhead}} \leq d_{\text{scan}} \quad \text{Or} \quad n_{\text{subscan}}^{\text{max}} \leq \frac{d_{\text{scan}} - t_{\text{scan}}^{\text{overhead}}}{t_{\text{subscan}} + t_{\text{subscan}}^{\text{overhead}}}$$







0509

$$\Delta \| + \Delta array + \Delta throw + \Delta base$$



an empirical investigation of Δ_{con} .





$$\Delta_{\text{submap}} = 0.5 \left(\sqrt{\Delta_{\text{edge}}^2 + 4d_{\text{submap}} \delta v_{\parallel}} - \Delta_{\text{edge}} \right)$$

$\Delta edge = \Delta array + \Delta row + \Delta base$



$\Delta_{\text{moe}} + \Delta_{\text{array}} + \Delta_{\text{throw}} + \Delta_{\text{base}}$

$\Delta \text{vmap} + \Delta \text{array} + \Delta \text{brown} + \Delta \text{base}$

$$\Delta_{\parallel \text{mos}}^2 + \Delta_{\perp \text{mos}}^2$$

$$\Delta_{\text{submap}}^2$$

$$n_{cal} = \text{ceil}\left(\frac{e_{tel} t_{tel}}{d_{cal} + t_{cal}}\right),$$



$$t_{\text{source}} = \frac{E_{\text{tel}} t_{\text{tel}} - n_{\text{cal}} t_{\text{cal}}}{n_{\text{source}}}.$$

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ca1/e1



WORLD

evbcbad and max are fixed;

$$t_{\text{scan}} = \gamma_{\text{max}} (t_{\text{subscan}} + t_{\text{overhead}}) + t_{\text{scan}}.$$

$$t_{\text{subscan}} = \frac{\Delta_{\text{tot}}}{v_{\parallel}} ,$$

$$n_{\text{subscan}}^{\text{max}} = \text{floor} \left(\frac{d_{\text{scan}} - t_{\text{scan}}}{t_{\text{subscan}} + t_{\text{overhead}}^{\text{subscan}}} \right),$$



if $\frac{MA}{subscan} > 1$, then send an error message advising to increase $subscan$.



$$t_{\text{scan}} = \gamma_{\text{max}} (t_{\text{subscan}} + t_{\text{overhead}}) + t_{\text{scan}}.$$

$$n_{\text{scan}} = \text{floor} \left(\frac{t_{\text{source}}}{t_{\text{scan}}} \right),$$

$$n_{\text{subscan}}^{\text{res}} = \text{floor} \left(\frac{t_{\text{source}} - n_{\text{scan}} t_{\text{scan}} - t_{\text{overhead}}}{t_{\text{subscan}} + t_{\text{overhead}}} \right),$$

$$n_{\text{tot}} = n_{\text{scad}} n_{\text{max}} + n_{\text{res}}$$

$$n_{\text{subscan}}^{\text{cover}} = \text{ceil} \left(\frac{\Delta_{\text{tot}}}{\delta} + 1 \right),$$

$$n_{\text{cover}} = \text{floor} \left(\frac{n_{\text{subscan}}^{\text{tot}}}{n_{\text{subscan}}^{\text{cover}}} \right),$$

if $\text{cover} < 1$, then send an error message advising to increase cov ;

toot = *cover* *toot*

$$n_{\text{scan}} = \text{floor} \left(\frac{n_{\text{subscan}}^{\text{tot}}}{n_{\text{subscan}}^{\text{max}}} \right),$$

$$res_{tot} = res_{max}$$

$$t = (n_{\text{max}} + n_{\text{res}}) \cdot \text{subcan}$$

$$\sigma = \frac{\text{NEFD} \exp(A \tau_{\text{zen}})}{\sqrt{t_{\sigma}}}.$$

$$\sigma = \alpha \exp(A \tau_{\text{zen}}) \sqrt{\frac{\delta v_{\parallel}}{n_{\text{cover}}}};$$

$$t_{\text{source}} = n_{\text{scan}} t_{\text{scan}} + \left[n_{\text{res}} (t_{\text{subscan}} + t_{\text{overhead}}) + t_{\text{scan}} \right]$$

$$n_{cal} = \text{ceil}\left(\frac{n_{source} t_{source}}{d_{cal}}\right),$$

$$t_{tel} = \frac{n_{source} t_{source} + n_{cal} t_{cal}}{\epsilon_{tel}}.$$

$$t_{\sigma} = \left[\frac{\text{NEED} \exp(A \tau_{zen})}{\sigma} \right]^2,$$

$$n_{\text{subscan}}^{\text{tot}} = \text{ceil} \left(\frac{t_{\sigma}}{t_{\text{subscan}}} \right).$$

$$n_{\rm cover} = \text{floor} \left\{ \delta v_{\parallel} \left[\frac{a \exp(A \tau_{\rm zen})}{\sigma} \right]^2 \right\},$$

if ever, then send an invitation to discuss,

$$n_{\text{subscan}}^{\text{cover}} = \text{ceil} \left(\frac{\Delta_{\text{tot}}}{\delta} + 1 \right),$$

total = recovered + covered















100%

dead
boi







