

Geometric Impedance of Tapered Collimator

Stupakov's formula:

$$Z_{\perp} = -\frac{iZ_0 \theta}{\pi b} \left(x + \left(\frac{\pi h}{2b} - 1 \right) x_t \right)$$

θ taper angle, b half gap, h half width

$h/b \gg 1 \rightarrow$ quadrupole wake dominant (emittance growth?)

Using $b \approx 1.25$ mm, $h = 20$ mm, $\theta = 15^\circ$ (0.26 rad), we get for 1 collimator:

$$Z_{\perp} \approx -i 26 \text{ k}\Omega/\text{m } x - i 400 \text{ k}\Omega/\text{m } x_t$$