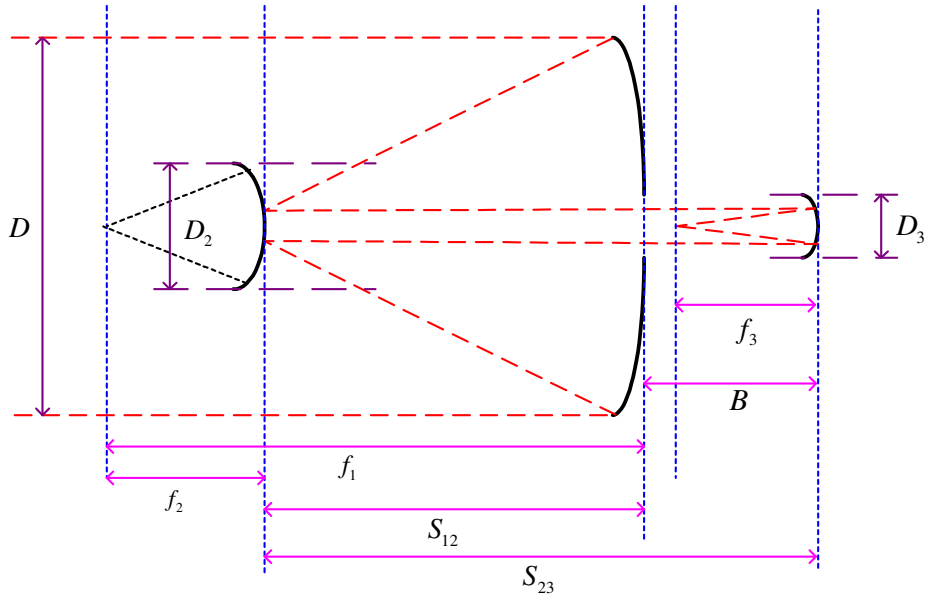
Paul Baker Telescope Focal Length Parameter Relationships

J.A. Crawford See U15527



$f_{eff} := 1200$

$F_{sys} := 4$

$D := \frac{f_{eff}}{F_{sys}}$

D = 300

$ii := 0 .. 100$

$f1_{ii} := 0.05 \cdot f_{eff} + 0.9 \cdot f_{eff} \cdot 0.01 \cdot ii$

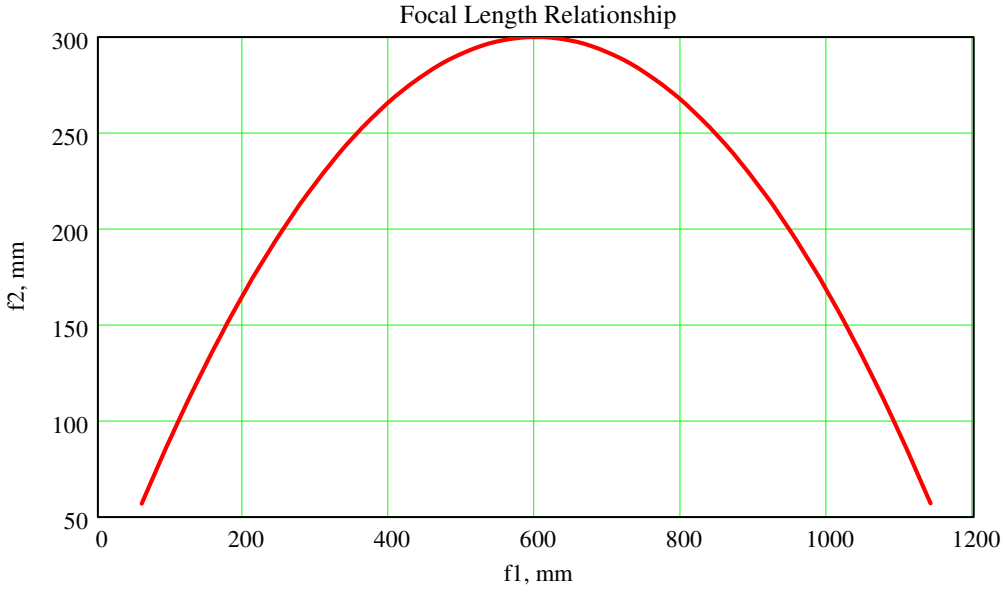
$k_{ii} := 1 - \frac{f1_{ii}}{f_{eff}}$

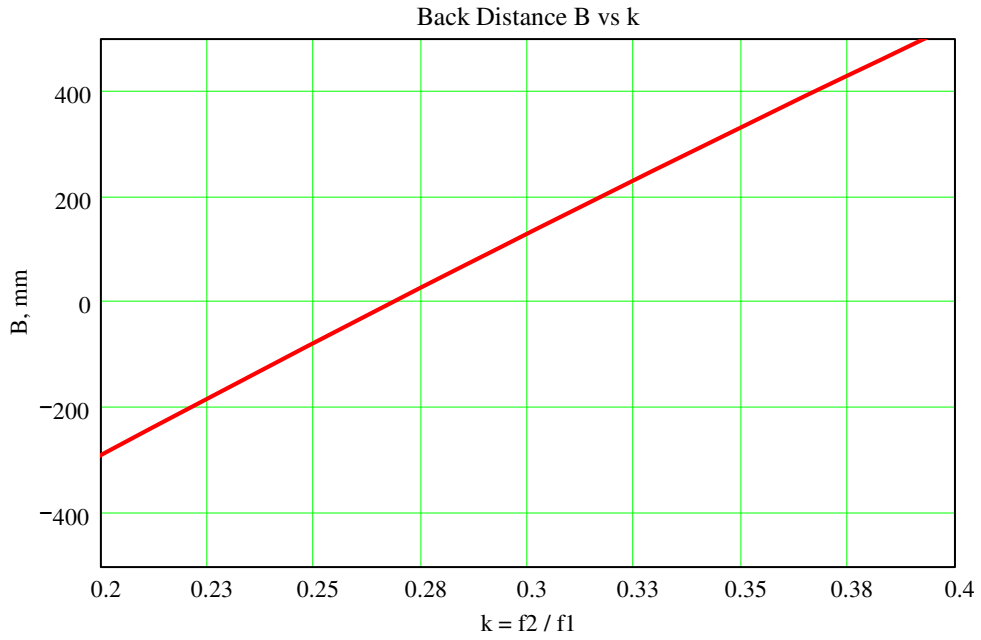
$f2_{ii} := k_{ii} \cdot f1_{ii}$

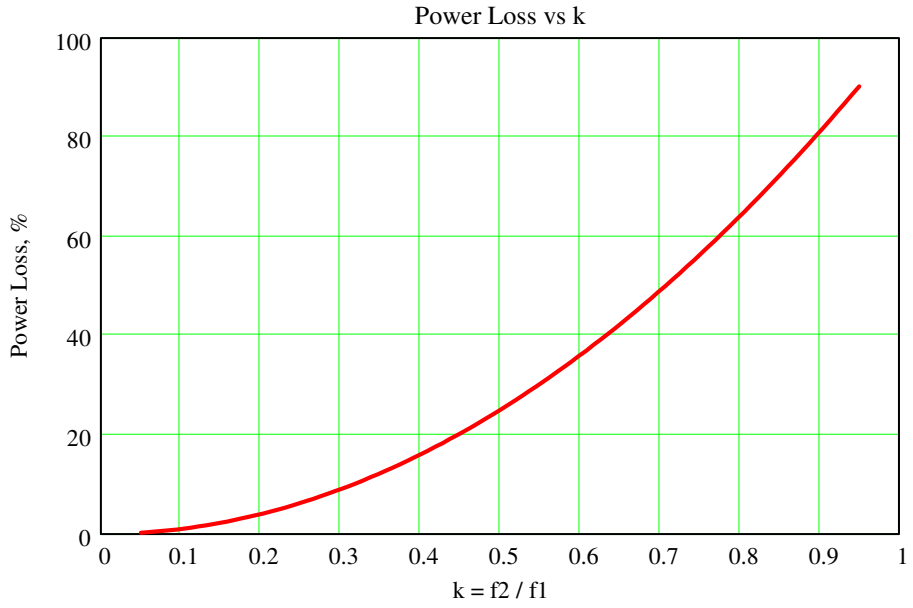
$B_{ii} := \frac{2 \cdot f2_{ii} \cdot f1_{ii}}{f1_{ii} - f2_{ii}} - f1_{ii} + f2_{ii}$

$D2_{ii} := D \cdot k_{ii}$

$f3_{ii} := \frac{f2_{ii}}{1 - k_{ii}}$

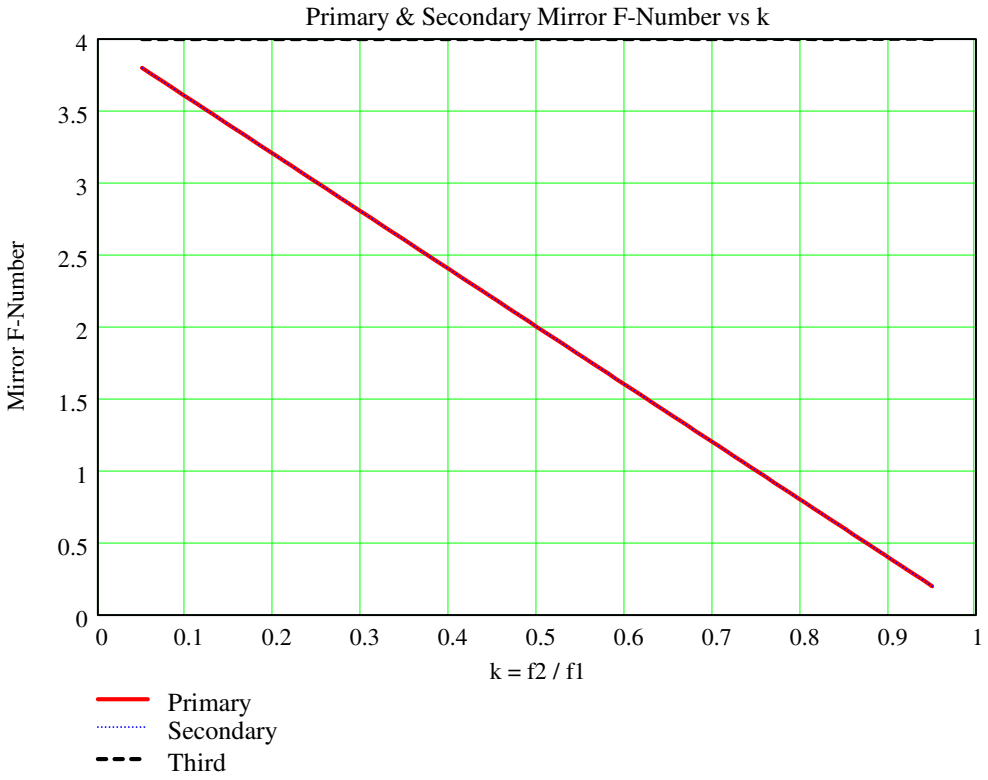


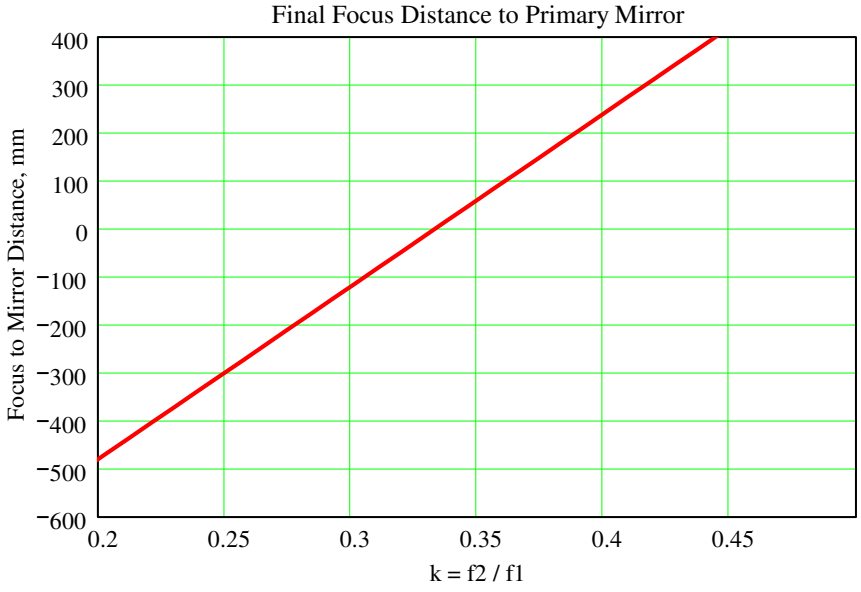




$$F1_{ii} := \frac{f1_{ii}}{D} \qquad F2_{ii} := \frac{f2_{ii}}{D2_{ii}} \qquad F3_{ii} := \frac{1}{1 - k_{ii}} \cdot \frac{f2_{ii}}{D2_{ii}}$$

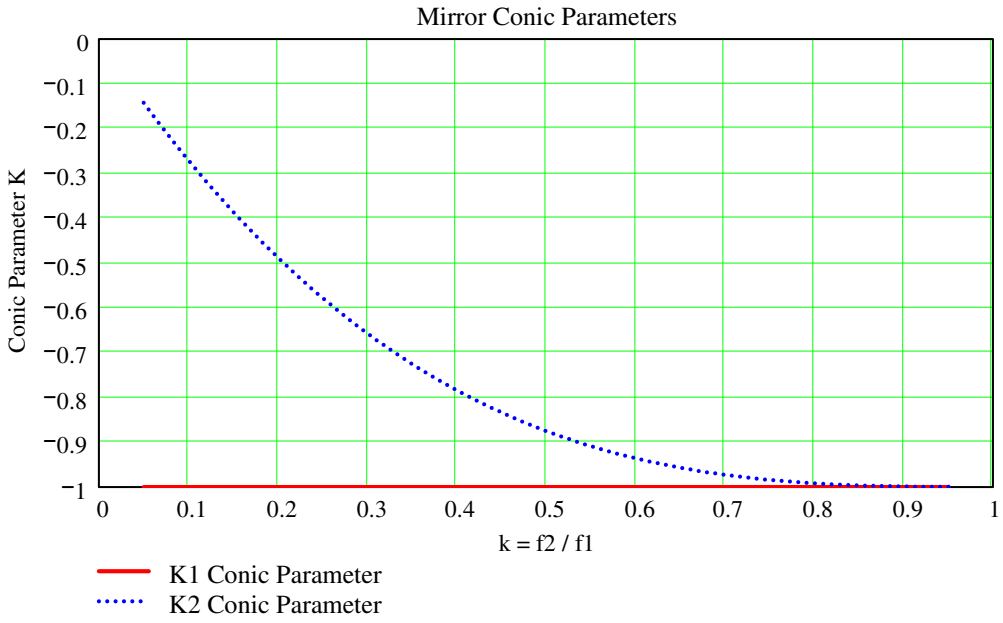
Compute all F-numbers





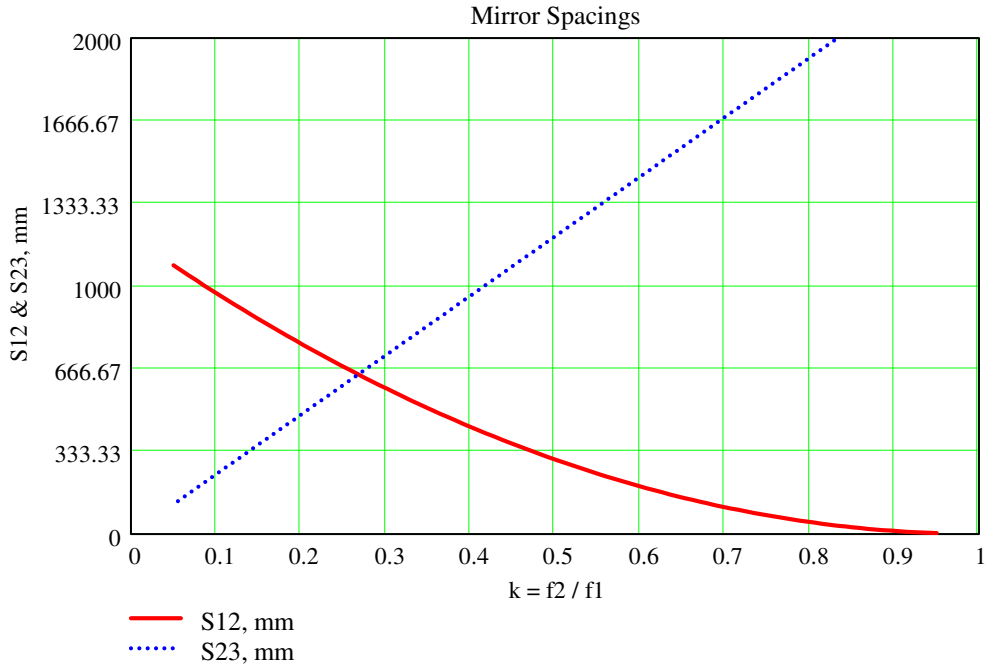
$K_1 := -1$

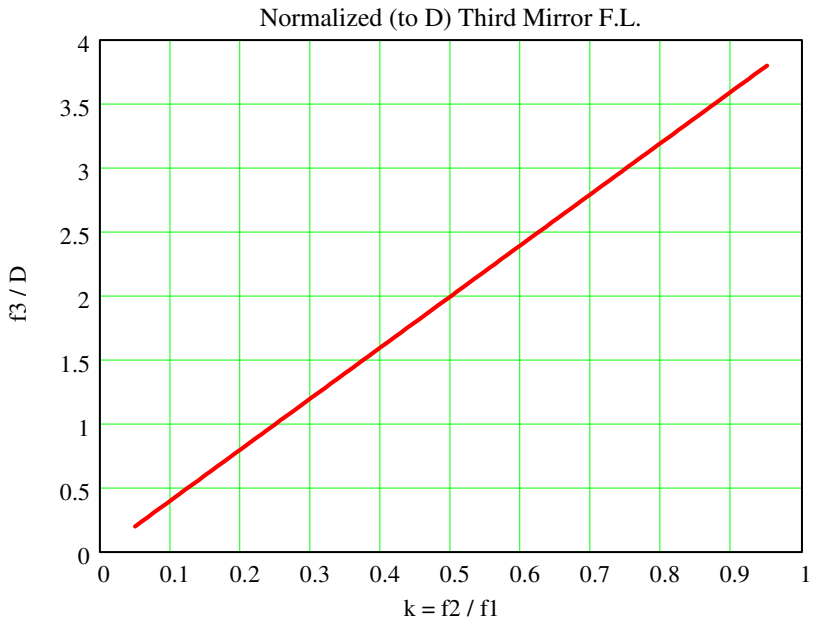
$K_{2_{ii}} := -1 + \left(\frac{f_{2_{ii}}}{f_{3_{ii}}}\right)^3$

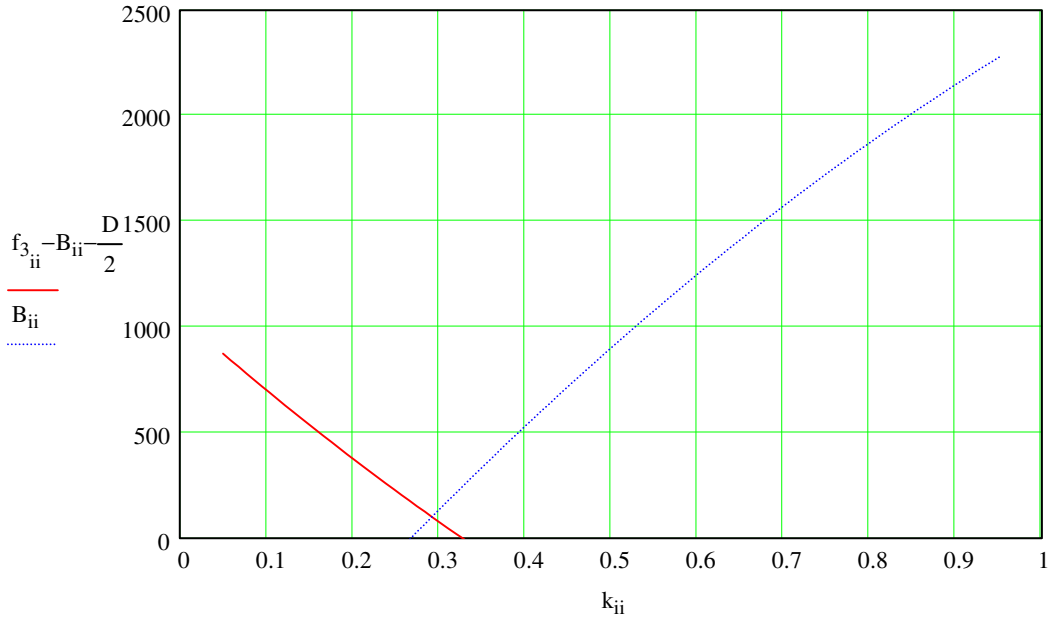


$$S12_{ii} := f1_{ii} - f2_{ii}$$

$$S23_{ii} := S12_{ii} \cdot \frac{f3_{ii}}{f2_{ii}} \cdot \left(\frac{2 \cdot k_{ii}}{1 - k_{ii}} \right)$$







Delineate parameters for specific case

$f_{eff} := 1200$ $k := 0.3$

$F_{sys} := 4$

$D := \frac{f_{eff}}{F_{sys}}$ $D = 300$

$D_2 := D \cdot k$ $D_2 = 90$

$f_1 := (1 - k) \cdot f_{eff}$ $f_1 = 840$ $R_1 := 2 \cdot f_1$ $R_1 = 1.68 \times 10^3$

$f_2 := k \cdot f_1$ $f_2 = 252$ $R_2 := 2 \cdot f_2$ $R_2 = 504$

$B := \frac{2 \cdot k}{1 - k} \cdot f_1 - f_1 + f_2$ $B = 132$

$f_3 := \frac{f_2}{1 - k}$ $f_3 = 360$ $R_3 := 2 \cdot f_3$ $R_3 = 720$

$P_{loss} := k^2$ $P_{loss} \cdot 100 = 9$

$Fnums := \left(\frac{f_1}{D} \quad \frac{f_2}{D_2} \quad \frac{1}{1 - k} \cdot \frac{f_2}{D_2} \right)$ $Fnums = (2.8 \quad 2.8 \quad 4)$

$S_{12} := f_1 - f_2$ $S_{12} = 588$

$S_{23} := S_{12} \cdot \frac{f_3}{f_2} \cdot \left(\frac{2 \cdot k}{1 - k} \right)$ $S_{23} = 720$

$B := \frac{2 \cdot f_1 \cdot f_2}{f_1 - f_2} - f_1 + f_2$ $B = 132$

$K_1 := -1$

$K_2 := -1 + \left(\frac{R_2}{R_3} \right)^3$ $K_2 = -0.657$

$\frac{f_3}{D} = 1.2$