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A Lower Bound for the Area of the Fundamental Region of a Binary Form

Let

$$F(x,y) = \prod_{k=1}^{n} (\delta_k x - \gamma_k y)$$

be a binary form of degree $n \geq 1$, with complex coefficients, written as a product of n linear forms in $\mathbb{C}[x,y]$. Let

$$h_F = \prod_{k=1}^{n} \sqrt{|\gamma_k|^2 + |\delta_k|^2}$$

denote the height of F and let A_F denote the area of the fundamental region $\mathcal{D}_F$ of F:

$$\mathcal{D}_F = \left\{(x,y) \in \mathbb{R}^2 \colon |F(x,y)| \leq 1\right\}.$$

We prove that $h_F^{2/n} A_F \geq \left(2^{1+(r/n)}\right)\pi$, where r is the number of roots of F on the real projective line $\mathbb{RP}^1$, counting multiplicity.