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Hyperbolically convex standard fundamental domain of a subgroup of a modular group.

The two major ways of obtaining fundamental domains for discrete subgroups of $SL(2,R)$ are the Dirichlet Polygon construction and Ford's construction. Each of these two methods yield a hyperbolically convex fundamental domain for any discrete subgroup of $SL(2,R)$.

However, the Dirichlet polygon construction and Ford's construction are not well adapted for the actual construction of a hyperbolically convex fundamental domain due to their nature of construction.

A third-and most important method of obtaining a fundamental domain is through the use of a right coset decomposition as described below. Let Γ_2 be a subgroup of Γ_1 and $\Gamma_1 = \Gamma_2 \cdot \{L_1, L_2, \cdots, L_m\}$ If F is a fundamental domain of the bigger group Γ_1, then the set $R_\Gamma = \left(\overline{\bigcup_{k=1}^{m} L_k(F)}\right)^o$ is a fundamental domain of Γ_2. One can ask at this juncture that is it possible to choose the right coset suitably so that the set $\mathcal{R}_\Gamma$ is hyperbolically convex? We will answer this question positively for normal subgroups of $\Gamma_1 = \Gamma(1)$ and $F = \left\{\tau \in H : |\tau| > 1 \;\&\; |Re(\tau)| < \frac{1}{2}\right\}$. Also we will extend this for normal subgroups of Hecke discrete groups. (Received September 16, 2005)