Boğaziçi
MATH GRAD SEMINAR

Trace Formula for Finite Groups

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Abstract:

Let G be a finite group and consider a subgroup Γ of G along with a representation $\rho : \Gamma \to \mathrm{GL}(V_\rho)$ of Γ on a finite dimensional $\mathbb{C}$-linear vector space V_ρ. We get the trace formula by computing the trace of the operator $\mathrm{Ind}_\Gamma^G(\rho)(f) : \mathrm{Ind}_\Gamma^G(V_\rho) \to \mathrm{Ind}_\Gamma^G(V_\rho)$ for a test function $f : G \to \mathbb{C}$. Our aim is to present this computation in two different ways, that is, by expressing the spectral side $J(\rho, f)$ and the geometric side $I(\rho, f)$ of the formula. The expression $I(\rho, f)$ is a sum over non-isomorphic irreducible representations of G having the multiplicities of the irreducible representations emerging in the decomposition of the induced representation $\mathrm{Ind}_\Gamma^G(\rho)$ within and the geometric side $I(\rho, f)$ of the trace formula is obtained by calculating the conjugacy classes of the groups Γ and G. We call the generalized formula $J(\rho, f) = \mathrm{Tr}(\mathrm{Ind}_\Gamma^G(\rho)(f)) = I(\rho, f)$ the trace formula for the finite group G with respect to the subgroup Γ and $\rho : \Gamma \to \mathrm{GL}(V_\rho)$.

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