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Poincaré series operator on spaces of automorphic forms

Let R be a hyperbolic Riemann surface, and Δ the unit disk. Let Γ be the fundamental group for R, so $R = \Gamma \backslash \Delta$. An automorphic form of weight k is a function $\phi : \Delta \to \mathbb{C}$ with $\phi(z) = \phi(\gamma z)\gamma'(z)^k$, for any $\gamma \in \Gamma$ and any $z \in \Delta$. Automorphic forms appear in various subjects of mathematics for example number theory and mathematical physics. Poincaré series is a way to construct automorphic forms. I will talk about some properties and applications of Poincaré series map on spaces of automorphic forms.