On a Certain Residual Spectrum of $\text{Sp}_8$

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Abstract. Let $G = \text{Sp}_{2n}$ be the symplectic group defined over a number field $F$. Let $A$ be the ring of adeles. A fundamental problem in the theory of automorphic forms is to decompose the right regular representation of $G(A)$ acting on the Hilbert space $L^2(G(F) \setminus G(A))$. Main contributions have been made by Langlands. He described, using his theory of Eisenstein series, an orthogonal decomposition of this space of the form:

$$L^2(G(F) \setminus G(A)) = \bigoplus_{(M, \pi)} L^2_{\text{dis}}(G(F) \setminus G(A))_{(M, \pi)},$$

where $(M, \pi)$ is a Levi subgroup with a cuspidal automorphic representation $\pi$ taken modulo conjugacy. (Here we normalize $\pi$ so that the action of the maximal split torus in the center of $G$ at the archimedean places is trivial.)

and $L^2_{\text{dis}}(G(F) \setminus G(A))_{(M, \pi)}$ is a space of residues of Eisenstein series associated to $(M, \pi)$. In this paper, we will completely determine the space $L^2_{\text{dis}}(G(F) \setminus G(A))_{(M, \pi)}$, when $M \simeq \text{GL}_2 \times \text{GL}_2$. This is the first result on the residual spectrum for non-maximal, non-Borel parabolic subgroups, other than $\text{GL}_n$. 

Received by the editors April 4, 2002.

AMS subject classification: 11F70, 22E55.