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Kyle J Czarnecki* (kyle-czarnecki@uiowa.edu), 14 MacLean Hall, Department of Mathematics, University of Iowa, Iowa City, IA 52242-1419. *Resonance Sums for Rankin-Selberg Products of $SL_m(\mathbb{Z})$ Maass Cusp Forms.*

Let f and g be Maass cusp forms for $SL_m(\mathbb{Z})$ and $SL_{m'}(\mathbb{Z})$, respectively, with $2 \leq m \leq m'$. Let $\lambda_{f \times g}(n)$ be the normalized coefficients of $L(s, f \times g)$, the Rankin-Selberg L -function for f and g . We derive the asymptotics of a Voronoi-type summation formula for $\lambda_{f \times g}(n)$. As an application estimates are obtained for the smoothly weighted average of $\lambda_{f \times g}(n)$ against $e(\alpha n^\beta)$. When $\beta = \frac{1}{mm'}$ and α is close or equal to $\pm mm'q^{\frac{1}{mm'}}$ for a positive integer q , the average has a main term of size $|\lambda_{\tilde{f} \times \tilde{g}}(q)|X^{\frac{1}{2mm'} + \frac{1}{2}}$. Otherwise, when $0 < \beta < \frac{1}{mm'}$, it is shown that this average decays rapidly. This phenomenon is due to the oscillatory nature of the coefficients $\lambda_{f \times g}(n)$. (Received September 21, 2015)