RESEARCH ANNOUNCEMENTS

The purpose of this department is to provide early announcement of significant new results, with some indications of proof. Although ordinarily a research announcement should be a brief summary of a paper to be published in full elsewhere, papers giving complete proofs of results of exceptional interest are also solicited. Manuscripts more than eight typewritten double spaced pages long will not be considered as acceptable.

A MAXIMAL PROBLEM IN HARMONIC ANALYSIS. III

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1. **Introduction.** Let G be a compact group. Let Σ denote the set of all equivalence classes of continuous irreducible unitary representations of G. For each $\sigma\in\Sigma$, let $U^{(\sigma)}$ be a fixed member of σ. Let H_σ be the [finite-dimensional] Hilbert space on which $U^{(\sigma)}$ acts, and let d_σ denote the dimension of H_σ. Let $\mathfrak{E}(\Sigma)$ denote the product space $P_{\sigma\in\Sigma}\mathfrak{B}(H_\sigma)$. For $f\in\mathfrak{L}_1(G)$, the Fourier transform $\hat{f}$ is the element of $\mathfrak{E}(\Sigma)$ such that

$$\langle \hat{f}(\sigma)\xi,\eta\rangle = \int_G \overline{\langle U_x^{(\sigma)}\xi,\eta\rangle} f(x)dx$$

for all ξ, $\eta\in H_\sigma$ and $\sigma\in\Sigma$.

For an operator A on a finite-dimensional Hilbert space, $|A|$ denotes the unique positive-definite square root of $AA^\sim$ [$\sim$ denotes adjoint]. If $a_1, \cdots, a_n$ denote the eigenvalues of $|A|$, then $\|A\|_{\phi_p}$ denotes $(\sum_1^n a_k^p)^{1/p}$ for $1\leqq p<\infty$ and $\|A\|_{\phi_\infty}$ denotes $\max\{a_k\colon 1\leqq k\leqq n\}$ $=$ operator norm of A. Let E be an element in $\mathfrak{E}(\Sigma)$. Following R. A. Kunze [4], we define

$$\|E\|_p = \left(\sum_{\sigma\in\Sigma} d_\sigma\|E_\sigma\|_{\phi_p}^p\right)^{1/p}$$

for $1\leqq p<\infty$, and $\|E\|_\infty=\sup\{\|E_\sigma\|_{\phi_\infty}\colon\sigma\in\Sigma\}$. Finally, we define $\mathfrak{E}_p(\Sigma)=\{E\in\mathfrak{E}(\Sigma)\colon \|E\|_p<\infty\}$ for $1\leqq p\leqq\infty$.

Kunze [4] has proved the following Hausdorff-Young theorems [in considerably greater generality]:

A. *If* $f\in\mathfrak{L}_p(G)$, $1\leqq p\leqq 2$, *and* $1/p+1/p'=1$, *then* $\hat{f}\in\mathfrak{E}_{p'}(\Sigma)$ *and*
(a) $\|\hat{f}\|_{p'}\leqq\|f\|_p$.

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