D. Gourevitch

Faculty of Mathematics and Computer Science, Weizmann Institute of Science, POB 26, Rehovot 76100, Israel
`dimagur@weizmann.ac.il`

A. Kemarsky

Mathematics Department, Technion, Israel Institute of Technology, Haifa 32000, Israel
`alexkem@tx.technion.ac.il`

Irreducible Representations of a Product of Real Reductive Groups

Let G_1, G_2 be real reductive groups and (π, V) be a smooth admissible representation of $G_1 \times G_2$. We prove that (π, V) is irreducible if and only if it is the completed tensor product of (π_i, V_i), $i = 1, 2$, where (π_i, V_i) is a smooth, irreducible, admissible representation of moderate growth of G_i, $i = 1, 2$. We deduce this from the analogous theorem for Harish-Chandra modules, for which one direction was proved by A. Aizenbud and D. Gourevitch ["Multiplicity one theorem for $(GL_{n+1}(\mathbb{R}), GL_n(\mathbb{R}))$", Selecta Mathematica N. S. 15 (2009) 271–294], and the other direction we prove here. As a corollary, we deduce that strong Gelfand property for a pair $H \subset G$ of real reductive groups is equivalent to the usual Gelfand property of the pair $\Delta H \subset G \times H$.

Keywords: Gelfand pair.

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