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Local Integrability of Characters on $GL(2)$, Orbital Integrals, Germs

The character $\text{tr}\pi$ of an irreducible admissible representation π of the group $G(F)$ of F -points of a reductive connected linear algebraic group G over a local non-Archimedean field F has been shown by Harish-Chandra to be locally constant on the regular set and *locally integrable*, that is, representable by a function χ with such properties, when the characteristic of F is 0. His method was extended to $G = GL(n)$ and its inner forms for all characteristics. Earlier this result had been proven for $G = GL(2)$ and F of any characteristic, characteristic two being the difficult case, in Jacquet-Langlands, by a direct and relatively elementary approach. We give here another proof by explicit computation, in this case of $GL(2)$ and F of any characteristic, especially two, which we believe extends to other low rank groups. Our computation gives an explicit evaluation of the orbital integral of the characteristic function χ_K of the maximal compact subgroup K . We use this to compute the coefficients in the germ expansion of the orbital integrals on G , and observe that the germ expansion of the orbital integral of χ_K extends to all of K .

Keywords: Local integrability, characters, invariant distributions, orbital integrals, unit element in Hecke algebra, reductive groups, orbits.

MSC: 22E50, 22E35, 11F70