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Uniform in p bounds for orbital integrals

It is a well-known theorem of Harish-Chandra that the orbital integrals, normalized by the square root of the discriminant, are bounded (for a fixed test function). However, it is not easy to see how this bound behaves if we let the p-adic field vary (for example, if the group G is defined over a number field F, and we consider the family of groups $G_v = G(F_v)$, as v runs over the set of finite places of F), and how it varies for a family of test functions. Using a method based on model theory and motivic integration, we prove that for a fixed test function, the bound on orbital integrals can be taken to be a fixed power (depending on G) of the cardinality of the residue field, and also obtain a uniform bound for the family of generators of the spherical Hecke algebra playing the role of the test functions. This statement has an application to the recent work of S.-W. Shin and N. Templier on counting zeroes of L-functions. This project is joint work with R. Cluckers and I. Halupczok.