BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 5, Number 2, September 1981

RESEARCH ANNOUNCEMENTS

ARTIN'S CONJECTURE FOR REPRESENTATIONS OF OCTAHEDRAL TYPE

BY JERROLD TUNNELL

Let L/F be a finite Galois extension of number fields. E. Artin conjectured that the L-series of a nontrivial irreducible complex representation of $\mathrm{Gal}(L/F)$ is entire, and proved this for monomial representations. The nonmonomial two-dimensional representations are those with image in $PGL(2, \mathbf{C})$ isomorphic to the group of rigid motions of the tetrahedron, octahedron or icosahedron. In [5] Langlands proved Artin's conjecture for all two-dimensional representations of tetrahedral type and certain octahedral representations when $F = \mathbf{Q}$. The purpose of this note is to prove the conjecture for all octahedral representations by using the methods of Langlands and an analytic result of Jacquet, Piatetskii-Shapiro and Shalika.

Let ρ be an irreducible two-dimensional complex representation of $\mathrm{Gal}(L/F)$. We say that a cuspidal automorphic representation π of $GL(2, \mathbf{A}_F)$ equals $\pi(\rho)$ if $\pi = \bigotimes \pi_v$ with $\pi_v = \pi(\rho_v)$ in the sense of [2, §12] for almost all places v of F. When $\pi = \pi(\rho)$ the L-series of π and ρ agree, and since cuspidal representations have entire L-series, Artin's conjecture follows. In [5, §3] Langlands used base change for $GL(2)$ to produce candidates for $\pi(\rho)$. When ρ is octahedral we will use the following result to show that one of Langlands' candidates is in fact $\pi(\rho)$.

THEOREM [4]. *Let K be a cubic extension of F (not necessarily Galois). For each automorphic cuspidal representation π of $GL(2, \mathbf{A}_F)$ there exists an automorphic representation $\Pi = BC_{K/F}(\pi)$ of $GL(2, \mathbf{A}_K)$ such that for almost all places v of F, and each place w of K dividing v, $\pi_v = \pi(\sigma_v)$ implies that $\Pi_w = \pi(\mathrm{Res}^{W_{F_v}}_{W_{K_w}} \sigma_v)$.*

This theorem is proved using the theory of automorphic forms on $GL(3)$ and $GL(2) \times GL(3)$. The basic concept is similar to that of the example of quadratic base change given in [3, §20]. We recall that the theory of base change developed in [5] treats the case of Galois cyclic change of base of prime degree,

Received by the editors February 25, 1981.
1980 *Mathematics Subject Classification.* Primary 12A70; Secondary 10D40.

0002-9904/81/0000-0403/$01.75