

EXPLICIT R=T VIA RANK BOUNDS

CATHERINE HSU

As illustrated by the Herbrand-Ribet theorem, the relationship between modular forms and Galois representations is a powerful tool for studying arithmetic properties of number fields. In this talk, I will discuss recent work, joint with Preston Wake and Carl Wang-Erickson, that explores the connection between a Galois deformation problem arising from Eisenstein congruences and the arithmetic of certain number fields with twisted-Heisenberg Galois group. We relate the rank of a certain Hecke algebra to an arithmetic invariant arising from the vanishing of a triple Massey product and deduce new R=T results in some cases in which Wiles' numerical criterion fails.