On growth of Hecke fields in a p-adic family and its application

Haruzo Hida

If a p-adic family of slope 0 Hecke eigenforms does not have complex multiplication, we prove infinite growth of the degree of the field generated by $U(p)$-Hecke eigenvalues of the family over the cyclotomic $\mathbb{Z}_p$-extension. Then we discuss some of many applications of this fact.

Suggested reading:

The result mentioned in the abstract is in my JAMS paper (J. Amer. Math. Soc. 24 (2011)), and another paper of mine contains a list of related topics (Journal of Number Theory 131 (2011) 1331-1346). These papers are posted at

http://www.math.ucla.edu/ hida/

In my lectures, we assume control theorems of the ordinary big Hecke algebra and associated Galois representation. For that, either take axiomatic formulation given in the above paper for granted or read Sections 3.1-3.2 and 4.2 of my World Scientific book (Geometric Modular Forms and Elliptic Curves, World Scientific Publishing Co., Singapore, 2000). Other suggested reading is classical Honda-Tate theory (see Honda's paper in J. Math. Soc. Japan, 20, 1968, 83-95 and Tate's Bourbaki talk: Seminaire Bourbaki, 11 (1968-1969), Exp. No. 352, these two papers are elementary).