

Coleman, Robert F.

Classical and overconvergent modular forms. (English) Zbl 0851.11030

Invent. Math. 124, No. 1-3, 215-241 (1996).

Let $F(q) = \sum_{n \geq 0} a_n q^n$ be an overconvergent p -adic modular form of level N , $(N, p) = 1$, and let U be the Atkin operator acting on q -expansions by $UF(q) = \sum_{n \geq 0} a_{pn} q^n$. The author proves that if F is a generalized eigenvector for U with eigenvalue λ of weight $k + 2$ and λ has p -adic valuation less than $k + 1$, then F is a classical modular form (Theorem 6.1). This implies Gouvêa's conjecture that every overconvergent p -adic modular form of sufficiently small slope is classical. The main ingredient in the proof of Theorem 6.1 is the assertion relating overconvergent modular forms to the de Rham cohomology of a certain coherent sheaf with connection on an algebraic curve (Theorem 5.4). Also, a generalization of Theorem 6.1 to level Np is proved (Theorem 8.1), and an interpretation of overconvergent forms of level Np as certain Serre p -adic modular forms with non-integral weight is given (Theorem 9.1).

Reviewer: [A.Dabrowski \(Szczecin\)](#)

MSC:

[11F33](#) Congruences for modular and p -adic modular forms
[14F40](#) de Rham cohomology and algebraic geometry

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Keywords:

Atkin operator; classical modular form; Gouvêa's conjecture; overconvergent modular forms; de Rham cohomology

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