On the slopes of the $U_5$ operator acting on overconvergent modular forms

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ABSTRACT. We show that the slopes of the $U_5$ operator acting on 5-adic overconvergent modular forms of weight $k$ with primitive Dirichlet character $\chi$ of conductor 25 are given by either

$$\left\{ \frac{1}{4} \left\lfloor \frac{8i}{5} \right\rfloor : i \in \mathbb{N} \right\} \text{ or } \left\{ \frac{1}{4} \left\lfloor \frac{8i + 4}{5} \right\rfloor : i \in \mathbb{N} \right\},$$

depending on $k$ and $\chi$.

We also prove that the space of classical cusp forms of weight $k$ and character $\chi$ has a basis of eigenforms for the Hecke operators $T_p$ and $U_5$ which is defined over $\mathbb{Q}_5(\sqrt[4]{5}, \sqrt[6]{3})$. 

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