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*Constructing simultaneous Hecke eigenforms.*

Cusp forms which are simultaneous eigenforms for the family of Hecke operators provide a distinguished class of modular forms. In particular, the Fourier coefficients of such forms have nice arithmetic properties, and each such form has an L-series which admits an Euler product. It is well known that each simultaneous eigenform is associated to a unique newform. We will give a characterization of all simultaneous eigenforms associated to a given newform, and give conditions under which the full space of cusp forms of level  $N$  is spanned by a basis of simultaneous eigenforms. (Received July 18, 2008)