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Michael Mertens, Ken Ono and Larry Rolen*, Department of Mathematics, 1420 Stevenson Center, Vanderbilt University, Nashville, TN 37240. *Mock modular Eisenstein series with Nebentypus.*

By the theory of Eisenstein series, generating functions of various divisor functions arise as modular forms. It is natural to ask whether further divisor functions arise systematically in the theory of mock modular forms. We establish, using the method of Zagier and Zwegers on holomorphic projection, that this is indeed the case for certain (twisted) “small divisors” summatory functions, which correspond to the classical theta functions of Shimura. These include generating functions for combinatorial objects such as the Andrews spt-function and the “consecutive parts” partition function. Finally, in analogy with Serre’s result that the weight 2 Eisenstein series is a p-adic modular form, we show that these forms possess canonical congruences with modular forms. (Received September 01, 2019)