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Grant B Weller* (grantw@cmu.edu), Department of Statistics, 132 Baker Hall, Pittsburgh, PA 15213, and **Daniel Cooley** (cooleyd@stat.colostate.edu). *A Sum Characterization of Hidden Regular Variation in Multivariate Extremes.*

Many statistical methods for multivariate extremes rely on an underlying multivariate regularly varying probability distribution. Under this framework, dependence in the tail of the distribution is described by a limiting measure, which in some cases is degenerate on joint tail regions despite possible dependence in such regions at finite levels. Hidden regular variation, a higher-order tail decay on these regions, offers a refinement of the regular variation framework. We develop a representation of random vectors possessing hidden regular variation as the sum of independent regular varying components. The representation is shown to be asymptotically valid via a multivariate tail equivalence result. We develop a likelihood-based estimation procedure from this representation via a Monte Carlo expectation-maximization algorithm which has been modified for tail estimation. The methodology is employed in an air pollution monitoring application. (Received September 10, 2013)