1154-65-2617 **Lukas C. Erekson*** (lukas.erekson@gmail.com), Lukas.Erekson@gmail.com, and **Suzanna Stephenson**, **Daniel Christensen**, **Natalie Larsen** and **Tyler Jarvis**. *A Hybrid Multivariate Root-finding Method For Smooth Functions.*

We present a multivariate numerical rootfinding algorithm to find all the common zeros in a given compact region in $\mathbb{R}^n$ of a system of functions. The method builds on ideas of Nakatsukasa, Noferini and Townsend to subdivide the original search interval and approximate the functions with Chebyshev polynomials. It then uses a variant of Telen and Van Barel's method to find the roots in each subdomain by computing eigenvectors or eigenvalues of the Chebyshev form of certain Möller-Stetter matrices constructed with a well-chosen basis. We compare the algorithm, in terms of accuracy and speed, to other popular numerical rootfinding algorithms, such as Bertini and Chebfun2. In many instances, this algorithm outperforms all known competitors. (Received September 17, 2019)