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Scott R Pope*, North Carolina State University, Department of Mathematics, Raleigh, NC 27695, and **Agnes Szanto**, North Carolina State University, Department of Mathematics, Raleigh, NC 27695. *Nearest Multivariate System with Given Root Multiplicities.*

We present a symbolic-numeric technique to find the closest multivariate polynomial system to a given one which has roots with prescribed multiplicity structure. We prove that the distance of the given system from the set of systems with given root multiplicity structure is equal to the least square value of the generalized Weierstrass map, defined by Ruatta to compute the exact roots of a polynomial system. We give explicitly an iteration function which computes this minimum. Our results extend previous results in the univariate case and in the multivariate case. (Received September 26, 2005)