1016-13-59   **Itnuit Janovitz-Freireich*** (`ijanovi2@ncsu.edu`), North Carolina State University, Mathematics Department, Campus Box 8205, Raleigh, NC 27695, and **Lajos Ronyai** and **Agnes Szanto**. *Approximate Radical of Ideals with Clusters of Roots.*

We present a method based on Dickson's lemma to compute the "approximate radical" of a zero dimensional ideal $\tilde{I}$ in $\mathbb{C}[x_1, \ldots, x_m]$ which has zero clusters: the approximate radical ideal has exactly one root in each cluster for sufficiently small clusters. Our method is "global" in the sense that it does not require any local approximation of the zero clusters: it reduces the problem to the computation of the numerical nullspace of the so called "matrix of traces", a matrix computable from the coefficients of the generating polynomials of $\tilde{I}$. To compute the numerical nullspace of the matrix of traces we propose to use Gauss elimination with pivoting, and we prove that if $\tilde{I}$ has k distinct zero clusters each of radius at most ε in the ∞-norm, then k steps of Gauss elimination on the matrix of traces yields a submatrix with all entries asymptotically equal to ε^2. In the univariate case our method gives an alternative to known approximate square-free factorization algorithms which is simpler and its accuracy is better understood. (Received January 24, 2006)