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NUMERICAL BIFURCATION OF SEPARABLE PARAMETERIZED EQUATIONS*

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Dedicated to Víctor Pereyra on the occasion of his 70th birthday

Abstract. Many applications give rise to separable parameterized equations, which have the form $A(y,\mu)z + b(y,\mu) = 0$, where $z \in \mathbb{R}^N$, $y \in \mathbb{R}^n$, $\mu \in \mathbb{R}^s$, and the $(N+n) \times N$ matrix $A(y,\mu)$ and $(N+n)$ vector $b(y,\mu)$ are C^2-Lipschitzian in $(y,\mu) \in \Omega \subset \mathbb{R}^n \times \mathbb{R}^s$. We present a technique which reduces the original equation to the form $f(y,\mu) = 0$, where $f : \Omega \to \mathbb{R}^n$ is C^2-Lipschitzian in (y,μ). This reduces the dimension of the space within which the bifurcation relation occurs. We derive expressions required to implement methods to solve the reduced equation. Numerical examples illustrate the use of the technique.

Key words. separable parameterized equations, singular value decomposition, static bifurcation points, extended systems, Newton's method, LU factorization, curve switching and tracking.

AMS subject classifications. 65P30, 65H10, 37G10, 34C23

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