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**Title.** Properties of quasipolynomial's spectrum admitting maximum number of real roots.

**Abstract.** Over the last decade, quasipolynomial functions have attracted significant attention from the dynamical systems and control communities. Such functions, defined as finite sums of polynomials weighted by exponential terms, naturally arise as characteristic equations of closed-loop delay differential equations and controlled partial differential equations. The spectrum of a quasipolynomial carries crucial information about the behavior of the associated closed-loop system; in particular, the rightmost root determines the exponential decay rate of solutions. However, due to the infinite number of roots, a systematic spectral analysis remains challenging. In this talk, we survey recent state-of-the-art properties of quasipolynomials with real roots. Particular emphasis is placed on interpolation properties, namely the existence of a one-to-one correspondence between sets of roots and the coefficients of the quasipolynomial. We then present factorization results expressing a quasipolynomial in terms of its roots. We also focus on quasipolynomials satisfying the Pólya-Szegő bound—the maximal number of coexisting real roots—and review recent techniques for determining the rightmost root. Finally, these results are applied in a control-oriented framework for low-order delay differential equations.

This is a joint work with I. Boussaada (L2S, CentraleSupélec), Silviu Niculescu (L2S, CentraleSupélec) & Fazia Bedouhene (LMPA, University of Tizy-Ouzou).