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Thomas R Cameron* (thcameron@davidson.edu). *On Descartes' rule of signs for matrix polynomials*. Preliminary report.

In this talk, we discuss an open problem regarding the generalization of Descartes' rule of signs for matrix polynomials

$$P(\lambda) = A_m \lambda^m + A_{m-1} \lambda^{m-1} + \cdots + A_1 \lambda + A_0,$$

where A_i are $n \times n$ Hermitian and positive/negative definite matrices, or otherwise null, and $A_m \neq 0$. Specifically, we conjecture that

$$z^+(P) \leq n \cdot v(P) \quad \text{and} \quad z^-(P) \leq n \cdot c(P),$$

where $z^+(P)$ denotes the number of positive eigenvalues of P , $z^-(P)$ the number of negative eigenvalues, $v(P)$ the number of alternations of signs of P , and $c(P)$ the number of permanences of signs.

In the process of building a case for our conjecture, we will gain perspective for the historical proofs of Descartes' rule and its extensions, which will lead to a better understanding of what makes this open problem both interesting and difficult. (Received September 24, 2017)