1003-15-1312   **Marianne Akian** (`Marianne.Akian@inria.fr`), INRIA, Domaine de Voluceau, 78153 Le Chesnay, France, **Ravindra Bapat** (`rbb@isid.ac.in`), Indian Statistical Institute, 110016 New Delhi, India, and **Stephane Gaubert*** (`Stephane.Gaubert@inria.fr`), INRIA, Domaine de Voluceau, 78153 Le Chesnay, France. *Perturbation of matrix eigenvalues and min-plus algebra.*

A result of Višik, Ljusternik, and Lidskiĭ gives simple formulæ for the first order asymptotics $\mathcal{L}_\epsilon \sim \lambda \epsilon^\Lambda$ of the eigenvalues $\mathcal{L}_\epsilon$ of a perturbed matrix $a + \epsilon b$, when ϵ tends to 0. When the matrix a is nilpotent, the leading exponents Λ are the inverses of the sizes of the Jordan blocks of a and the leading coefficients λ are obtained from the eigenvalues of certain Schur complements constructed from a and b, except when the matrices involved in this construction are singular. We give here new perturbation formulæ which reveal the tropical nature of the classical result and solve many of these singular cases. We show that the generic leading exponents of the eigenvalues of a perturbed matrix pencil are the "eigenvalues" of a min-plus matrix pencil, and that their leading coefficients are the eigenvalues of auxiliary matrix pencils constructed from certain optimal assignment problems. (Received October 04, 2004)

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