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Splitting, stiffness and low-rank: a second-order Strang method for matrix differential equations

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In this talk, we present a second-order Strang splitting approach for efficiently solving a class of stiff matrix differential equations with Sylvester-type structure. The key idea is to decompose the dynamics into a stiff linear component, which can be handled exactly using matrix exponentials, and a nonlinear component, which is treated by a second-order dynamical low-rank method. We discuss the motivation behind this splitting strategy and highlight its advantages for stiff problems. A central result is that, under suitable assumptions, the scheme retains second-order accuracy. Numerical experiments illustrate the accuracy, robustness, and computational efficiency of the method. This is a joint work with N. Guglielmi.

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