A low-rank splitting integrator for matrix differential equations
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In this talk we present a numerical integrator for determining low-rank approximations to solutions of large-scale matrix differential equations. In particular, we consider semilinear stiff problems and propose a low-rank integrator based on splitting methods to separate the stiff linear part of the equation from the non-stiff nonlinear one. Then the solutions of the subproblems are approximated by low-rank ones. The strength of the proposed approach is that the time integration is performed only on the low-rank factors of the solution. We provide a convergence analysis and discuss some numerical results.
This is joint work with H. Mena, A. Ostermann, L.-M. Pfurtscheller and H. Walach.

References

[1] H. Mena, A. Ostermann, L.-M. Pfurtscheller and C. Piazzola. Numerical low-rank approximation of matrix differential equations, *J. Comput. Appl. Math.* 340, 602–614, 2018.

[2] A. Ostermann, C. Piazzola and H. Walach. Convergence of a low-rank Lie–Trotter splitting for stiff matrix differential equations, *arXiv:1803.10473*, 2018.