

Numerical simulations of first order systems

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In this talk we consider problems of the class

$$(\partial_t M_0 + M_1 + A)U = F,$$

where ∂_t stands for the derivative with respect to time, $M_0 : H \rightarrow H$ and $M_1 : H \rightarrow H$ are bounded linear selfadjoint operators on some Hilbert space H , $A : D(A) \subset H \rightarrow H$ is an unbounded skew-selfadjoint operator on H and F is a given source term.

Many if not all physical linear problems fall into this class, including but not limited to convection-reaction-diffusion problems, linear elasticity and Maxwell's equations. We are interested in numerical methods for above problems and present some recent results including a singularly perturbed problem and homogenisation of Maxwell-type problems.

References:

- [1] <https://doi.org/10.1093/imanum/dry007>
- [2] <https://doi.org/10.1007/s10915-021-01638-1>
- [3] <https://doi.org/10.1002/mma.1110>

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