1068-65-345 **Michael Eiermann*** (ermann@math.tu-freiberg.de). *On Krylov subspace methods for matrix functions.*

Transient electromagnetics is a geophysical exploration method to determine subsurface electrical and magnetic properties. Its application requires the solution of an inverse problem for a Maxwell's equation. The corresponding forward problem is closely linked to the computation of $f(A)\mathbf{b}$, where $A \in \mathbb{C}^{n\times n}$, $\mathbf{b} \in \mathbb{C}^n$, and $f(\lambda) = f_t(\lambda) = e^{t\lambda}$ is the exponential function with time acting as a parameter $t$.

Here and in other applications the matrix $A$ is large and sparse or structured, typically resulting from discretization of an infinite-dimensional operator. In this case evaluating $f(A)\mathbf{b}$ by first computing $f(A)$ is usually unfeasible. The standard approach for approximating $f(A)\mathbf{b}$ directly is based on a Krylov subspace of $A$ with initial vector $\mathbf{b}$. The advantage of this approach is that it requires $A$ only for computing matrix-vector products and that it converges superlinearly for the exponential function. In this talk we review recent activities in this area and emphasize related open problems. (Received January 21, 2011)