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**Computing Matrix Exponentials Arising in Markov
Chains by Restarted Krylov Algorithm**

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It has been shown that Krylov space approach can result in an efficient algorithm for computing the transient solution of Markov Chains. Implementing Krylov algorithm, all the vectors which span the Krylov space have to be stored. Due to storage restrictions, the common approach is based on marching in time-steps. The size of the time step is dictated by the accuracy required and the amount of Krylov vectors which can be stored. In this talk we will present an algorithm which eliminates the need to divide the time interval into time steps. It treats the time domain as one unit even though the Krylov space is of low dimension. The solution vector, at any intermediate time level, can be computed for free. The new algorithm is based on a restart approach similar to the one used for solving linear systems. Using the restarted Krylov algorithm, the total number of matrix-vector multiplications is reduced significantly.