Krylov subspace methods to solve large Sylvester equations for T-congruence.

In this talk, we consider the matrix equation $AX + X^T B = C_1 C_2^T$, where the matrices A,B have size $n \times n$, C_1 and C_2 have size $n \times r$ with $r \ll n$ and the size of the unknown matrix X is $n \times n$.
When the value of n is moderate (let us say $n \leq 2000$), efficient methods of this equation have been developed recently, but if n is a large value, and A and B are sparse, this is an open problem.
We project this equation over a subspace of dimension m, with $m \ll n$ to find an approximated solution.
We choose to work on a Krylov subspace, in order to find an approximated low-rank solution for this equation, using Galerkin conditions over the residual. Finally, we implement an algorithm to find the solution of this equation and we show some numerical experiments.
This is a joint work with Froilán M. Dopico, Daniel Kressner and Valeria Simoncini.

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