

# Matrix Computations & Scientific Computing Seminar

Organizer: James Demmel & Ming Gu

Wednesday, 11:00am–12:00pm, 380 Soda

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March 16 **Florian Hecht**, UC Berkeley

*Updated Sparse Cholesky Factors for Co-Rotational Elastodynamics*

I will present work that was recently submitted to SIGGRAPH on "Updated Sparse Cholesky Factors for Co-Rotational Elastodynamics". We have developed a way to incrementally update the Cholesky factor of a sparse matrix for the simulation of elastic materials. Instead of updating the complete factor, we can do partial updates at a small and controllable sacrifice in accuracy. With these updates we can simulate objects faster than with a traditional Conjugate Gradient (CG) iterative solver. Furthermore with a direct Cholesky solver we make our solution times independent of material parameters and mesh quality. Our method also scales better for larger meshes than CG. I will explain in detail how efficient sparse direct solvers work and how we can use the same structures to do partial updates. I will also show the modifications to the base co-rotational method for elastodynamics that make this update scheme possible. Our factorization, solve and update routines are parallelized and I will talk about difficulties to achieve high performance on many cores.