M.Sc. Simulation Sciences, Summer Semester 2020

Fast Iterative Solvers

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Suggested Work on Project 1 - Part 2

GMRES

- Implement the GMRES method *without* preconditioning. It will be easy to add preconditioning later. Use the algorithm derived in class (Lecture 4).
- It is recommended to implement the Gram-Schmidt prodecure first. (Orthogonality of the new basis vectors can easily be tested by carrying out the dot products.)
- Then integrate the Givens rotations into the algorithm
- Finally, you need to implement a backward substitution algorithm to get the coefficient vector $\mathbf{y}^*$, which you use to assemble the solution. (Do not explicitly compute the inverse matrix of the triangular matrix R)
- For debugging you might want to test your algorithm for a very small matrix (e.g. a 3×3 matrix, where you can work out all the steps analytically for comparison purposes.)