

The aim of this project is to code the decomposition of singular pencils of matrices into its canonical form and then to extract the information so as to construct decoupling feedbacks and proper choice of outputs or use the information for disturbance rejection.

- Read paper [3].
- Read Chapter XII in [1].
- Read the stable implementation in [2].
- Implement both decompositions given in these two references [1] and [2].
- Apply the decompositions on various examples.
- Extract from the decomposition controlled invariant subspaces.
- Show through examples how to use the algorithms for both decoupling and disturbance rejection following the hints given in [3].

References

- [1] F.R. Gantmacher. *The theory of matrices*, volume II. AMS Chelsea Publishing, 1998.
- [2] P. van Dooren. The Computation of Kronecker's Canonical Form of a Singular Pencil. *Linear Algebra and its Applications*, 27:103–140, 1979.
- [3] M. E. Warren and A. E. Eckberg. On the Dimensions of Controllability Subspaces: A Characterization via Polynomial Matrices and Kronecker Invariants. *SIAM J. Control*, 13(2):434–445, 1973.