

Applications of common factor computation in signal processing

I. Markovsky, A. Fazzi, and N. Guglielmi
Vrije Universiteit Brussel (VUB) and Gran Sasso Science Institute (GSSI)
`ivan.markovsky@vub.ac.be`

We consider the problem of computing the greatest common divisor of a set of univariate polynomials and present applications of this problem in system theory and signal processing. One application is blind system identification: given the responses of a system to unknown inputs, find the system. Assuming that the unknown system is finite impulse response and at least two experiments are done with inputs that have finite support and their Z -transforms have no common factors, the impulse response of the system can be computed up to a scaling factor as the greatest common divisor of the Z -transforms of the outputs. Other applications of greatest common divisor problem in system theory and signal processing are finding the distance of a system to the set of uncontrollable systems and common dynamics estimation in a multi-channel sum-of-exponentials model.

References

- [1] I. Markovsky, A. Fazzi, and N. Guglielmi. Applications of polynomial common factor computation in signal processing. In *Latent Variable Analysis and Signal Separation, Lecture Notes in Computer Science*, pages 99–106. Springer, 2018.
- [2] I. Markovsky, T. Liu, and A. Takeda. Subspace methods for common dynamics estimation. Technical report, Dept. ELEC, Vrije Universiteit Brussel, 2019.