Probability of Feasible Loads in Passive Gas Networks

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In this talk the computation of the probability of feasibility of exit load vectors in passive steady-state gas networks for the transportation of natural gas is addressed.

Here, gas flow is modeled via Kirchhoff's first and second law, see [4]. Moreover, a characterization for feasibility is given. This characterization was proven in [2], where the probability of feasible exit load vectors was computed for networks with at most one cycle. In [2] as well as in this talk, a reparametrization method for multivariate integrals known as spheric-radial decomposition is used to compute the probability of feasibility. To extend the procedure to networks with more than one cycle, Gröbner basis methods turned out to be useful. For an introduction on Gröbner bases see, e.g., [1].

Another interesting task is to answer the question of feasibility for arbitrary exit load vectors. In a mathematical context this means that systems of parametric quadratic multivariate polynomials have to be solved. This can be done by extending Gröbner bases to comprehensive Gröbner systems, see e.g., [3], which yield parametric Gröbner bases.

References

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