

Zhu, Yunmin; Li, X. Rong**Recursive least squares with linear constraints.** (English) Zbl 1262.65050
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Summary: Recursive Least Squares (RLS) algorithms have wide-spread applications in many areas, such as real-time signal processing, control and communications. This paper shows that the unique solutions to linear-equality constrained and the unconstrained LS problems, respectively, always have exactly the same recursive form. Their only difference lies in the initial values. Based on this, a recursive algorithm for the linear-inequality constrained LS problem is developed. It is shown that these RLS solutions converge to the true parameter that satisfies the constraints as the data size increases. A simple and easily implementable initialization of the RLS algorithm is proposed. Its convergence to the exact LS solution and the true parameter is shown. The RLS algorithm, in a theoretically equivalent form by a simple modification, is shown to be robust in that the constraints are always guaranteed to be satisfied no matter how large the numerical errors are. Numerical examples are provided to demonstrate the validity of the above results.

MSC:

- [65F10](#) Iterative numerical methods for linear systems
- [15A06](#) Linear equations (linear algebraic aspects)
- [62F30](#) Parametric inference under constraints
- [94A12](#) Signal theory (characterization, reconstruction, filtering, etc.)

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