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# Controlled current quality improvement by multi-target linear quadratic regulator for the grid integrated renewable energy system\*

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**Abstract.** In this research, we propose a new technique for improvement of a current quality in the Grid Integrated Renewable Energy System (GIRES). The new technique is not only more flexible but also easy to implement. It can be easily implemented with the help of convex optimization.

The well-designed distribution system followed by the suitable regular framework will guarantee the reliable and efficient operation for the entire system. For better quality of the current, this optimal control strategy using multi-target linear quadratic regulator (multi-target LQR) is suggested for managing the real and reactive power flow between Renewable Energy System (RES) and the grid.

We present two techniques for solving multi-target LQR. Both techniques explore symmetry properties of matrices. Indeed a symmetric matrix solution of an algebraic Riccati equation is required for an orthogonal projection of given targets. Numerical results illustrate the effectiveness of the propose technique.

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**Keywords:** Linear quadratic control, renewable energy system, second ordered cone programming

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