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Stability Analysis of Some Nonlinear Feedback Control Methods for Beam Halo-Chaos Suppression

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Abstract: Control of beam halo-chaos has been a very challenging subject for research in recent years, in which some nonlinear feedback methods have been developed for suppression of beam halo-chaos in high-current proton linear accelerators. However, stability analysis of such successful nonlinear feedback control methods has not yet been rigorously carried out, which remains an important open topic in the field. In this letter, we present a rigorous mathematical analysis of several nonlinear feedback control methods that are applied to control beam halo-chaos with great success on simulations.

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