

## Control of Halo-Chaos in Beam Transport Network via Neural Network Adaptation with Time-Delayed Feedback

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**Abstract:** Subject of the halo-chaos control in beam transport networks (channels) has become a key concerned issue for many important applications of high-current proton beam since 1990'. In this paper, the magnetic field adaptive control based on the neural network with time-delayed feedback is proposed for suppressing beam halo-chaos in the beam transport network with periodic focusing channels. The envelope radius of high-current proton beam is controlled to reach the matched beam radius by suitably selecting the control structure and parameter of the neural network, adjusting the delayed-time and control coefficient of the neural network.

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**Key words:** beam transport network, periodic focusing channels, high-current proton beam, halo-chaos, neural network adaptation control, time-delayed feedback

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