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Dynamic aperture predictions with echo state networks

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The calculation of the volume of the phase-space stability region of hadron storage rings is currently performed through computer simulations of particles tracking in 6D coordinates, which are resource -and time-intensive processes. We have investigated in a previous paper the ability of an ensemble reservoir computing approach based on Echo State Networks to predict the long-term evolution of the radius of the phase-space region in which the motion of charged particles in hadron storage rings is bounded. Here, we perform a sensitivity analysis of the results of the Echo State Networks prediction with respect to different ways of splitting the original data set into a training, validation, and test set. This analysis confirms the validity of the splitting proposed in our previous paper and suggests that extending the validation phase too much is counterproductive.

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Footnotes

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Yes

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