

# Enhancement of ISO Score Accuracy in Rear-Impact Simulations Using Multi-Objective Optimization

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This study aimed to validate the effectiveness of multi-objective optimization in improving the accuracy of safety assessments using Computer Aided Engineering (CAE) in rear-impact neck protection performance tests, toward practical application. The accuracy metric defined in ISO 18571 (hereinafter referred to as “ISO score”) was applied to the time-history of CAE-generated injury evaluation metrics to maximize consistency with experimental results. As shown in Figs. 1, the agreement between CAE and experimental time-history responses was improved after optimization. Based on these results, preferred solutions were extracted by focusing on the anterior-posterior force at the upper neck (Upper\_Neck\_Fx) and the bending moment at the upper neck (Upper\_Neck\_My). Notably, Upper\_Neck\_Fx improved by 24.5%, demonstrating the effectiveness of ISO score-based optimization.

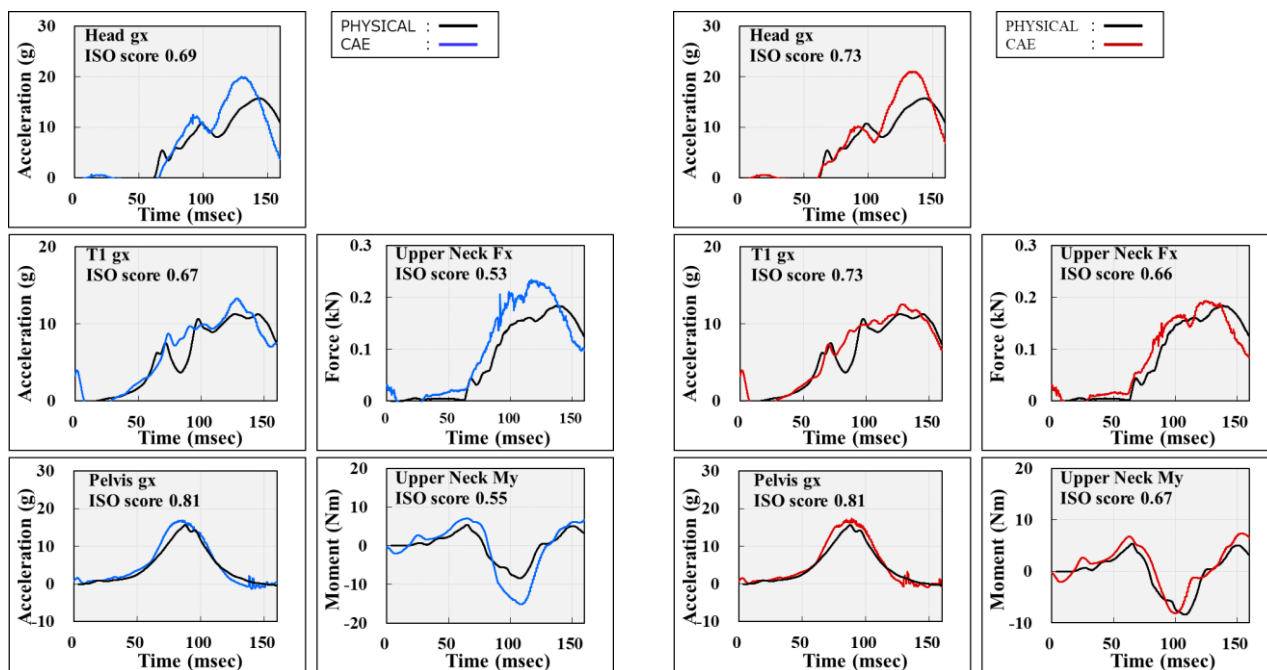


Fig. 1 Time-history data of evaluation metrics and ISO scores before and after optimization