Impact Load Identification Method based on Artificial Neural Network for Submerged Floating Tunnel Under Collision

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ABSTRACT

Submerged Floating Tunnel (SFT), unlike an underwater tunnel, may be collided by external vessel, such as submarine etc., in underwater environment. The collision with external vessel may cause structural damage and personal injury. For this reason, it is important to understand the structural stability of the SFT according to the collision, and it is necessary to identify the impact location and the magnitude of the impact load. In this study, we propose an artificial neural network for load identification using collision responses in real time to estimates the impact location and maximum impact force. A neural network based a multi-layered perceptron (MLP) was built and Abaqus was used to build SFT finite element model for collecting the training dataset. The neural network to estimate the impact location uses the maximum acceleration value, and the neural network to estimate the maximum impact force uses the maximum acceleration value and the impact location as training data. For the verification of the proposed estimation impact location network model, this research includes an experimental study using SFT model and result reveal that the impact location can be identified.
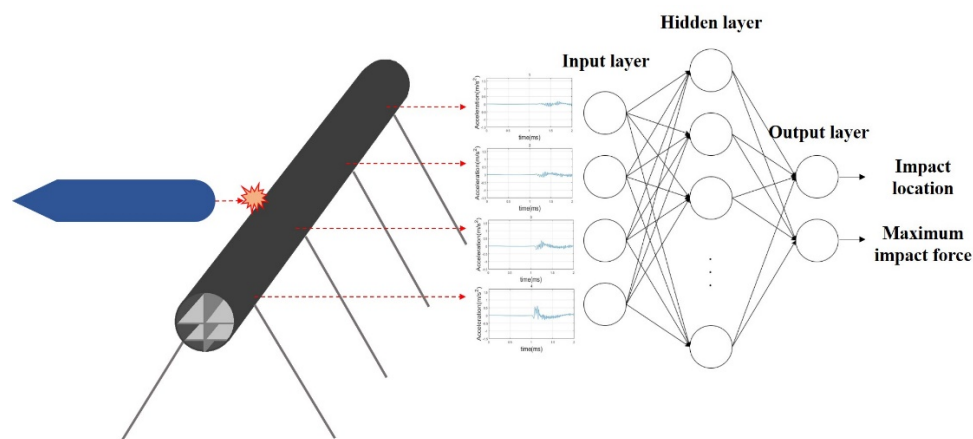
Fig. 1 Schematic of impact identification using MLP

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REFERENCES

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