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A moving mesh method to deal with cable structures subjected to moving loads and its application to the catenary-pantograph dynamic interaction

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Abstract— This paper presents a method to analyse the dynamic response of a cable structure subjected to moving loads. A moving mesh algorithm, integrated into a general finite element method, has been developed with regard to the contact between moving loads and cable structures. The application of the method to the interaction between railway overhead lines and train pantograph has been carried out in order to demonstrate the flexibility and advantages of this proposal against traditional meshing techniques. The simulation case corresponds to the reference model proposed by the European Standard EN 50318. The results of both models, with and without moving mesh, are accurate enough to obtain results inside the validation limits proposed by the same regulation. Moreover, the main advantage of the moving mesh method is that it is more than 2.5 times faster for an equivalent accuracy.

Index Terms—

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