Computation of the initial equilibrium of railway overheads based on the catenary equation

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Abstract-

A formulation based on the analytical catenary equation has been implemented to obtain the initial equilibrium state of railway overheads. Due to the intrinsic nonlinear behavior of catenaries, the Newton–Raphson method has been chosen to find the solution. The herein presented method provides fast, accurate and robust initial equilibrium conditions which can be readily plugged into other numerical methods to simulate the catenary–pantograph interaction dynamics. Moreover, the size of the resulting problem is only dependent on the number of droppers and spans of the catenary, which leads to a minimum size problem when it is compared to other numerical methods. The validity and accuracy of the method have been proved by comparing computed results to published results. The results show excellent agreement with the comparison data.

Index Terms- Catenary; Railway overhead; Initial equilibrium

Citation: