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Effects of Young's modulus on response of railway sleeper. (English) Zbl 1421.74061

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Summary: As a main part of a railroad system, sleepers have important duty in conveying the load from rails to the ballast. The different situations in which the sleepers should function necessitate making them from different materials, such as various types of wood, reinforced concrete and even steel. In this work, the effects of Young's modulus on response of railway sleeper are evaluated. As a main consideration, Winkler's theorem is used to model the behavior of the elastic foundation. First, the response of a sleeper on a Winkler's foundation is found. To evaluate the results of the closed form solution, a finite element model is used. Good agreement between the results of the closed form solution and the finite element model proves the validity of the results. In the next stage, the Young's modulus is considered as a variable and the fundamental diagrams of the beam are plotted based on the variation of Young's modulus.

MSC:

74K10 Rods (beams, columns, shafts, arches, rings, etc.)
74S05 Finite element methods applied to problems in solid mechanics

Keywords:

elastic foundation; sleeper; Young's modulus; finite element

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