

**Bajer, Czesław I.; Dyniewicz, Bartłomiej**

**Numerical analysis of vibrations of structures under moving inertial load.** (English)

Zbl 1254.74001

Lecture Notes in Applied and Computational Mechanics 65. Berlin: Springer (ISBN 978-3-642-29547-8/hbk; 978-3-642-29548-5/ebook). x, 294 p. (2012).

Many problems, e.g. static analysis, optimization, free vibrations etc. possess efficient numerical procedures implemented in commercial software, but the case of moving loads cannot be found in such computer codes; in this case one uses simplifications and approximations of analytical solutions. The authors deal with many numerical methods to solve problems concerning vibrations of structures under moving inertial loads; semi-analytical methods are presented to better understand the differential equations that govern the mechanical problems.

The above considerations are put in evidence by the contents, i.e.: 1. Introduction. 2. Analytical solutions. 3. Semi-analytical methods. 4. Review of numerical methods. 5. Classical numerical methods of time integration. 6. Space-time finite element method. 7. Space-time finite elements and a moving load. 8. The Newmark method and a moving inertial load. 9. Meshfree methods in moving load problems. 10. Examples of applications. An appendix contains computer programs for some structures, and a rich bibliography (154 titles) follows. Inertial loads moving on strings, beams and plates at sub- or super-critical speed are dealt with. The book can be useful for many engineers, researchers and students, and represents a valuable contribution to the field.

Reviewer: [Petre P. Teodorescu \(București\)](#)

**MSC:**

- 74-02 Research exposition (monographs, survey articles) pertaining to mechanics of deformable solids
- 74S05 Finite element methods applied to problems in solid mechanics
- 74H15 Numerical approximation of solutions of dynamical problems in solid mechanics
- 74H45 Vibrations in dynamical problems in solid mechanics

Cited in **12** Documents

**Keywords:**

[moving inertial loads](#); [vibrations of structures](#); [numerical analysis](#); [Newmark method](#); [finite element method](#); [meshfree method](#); [semi-analytical method](#)

**Full Text:** [DOI](#)