MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

DONETSK NATIONAL TECHNICAL UNIVERSITY

Dedicated to the seventieth anniversary
of Theoretical Mechanics Chair
of DonNTU

KINEMATICS

Summary of Lectures

Summary is approved
on meeting of the chair
of Theoretical Mechanics.
Record № 9, 19.02.2005

Summary is approved
By Educational and Methodical
Council of DonNTU
Record № 1, 14.03.2005

Donetsk - 2005

УДК 531(075.8)
Kinematics. Summary of lectures for the students of all specialities // Authors: Maleev V.B., Ignatov A.V., Blokhin S.E.,Gordeev G.G.// – Donetsk: Donetsk National Technical University, 2005 – 60 p.

Edited and Printed by the authors

The summary of the lectures on theoretical mechanics (part "Kinematics ") in English. The abstract is intended for the students of all specialties.

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МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

ДОНЕЦЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ

УНІВЕРСИТЕТ

Присвячено 70-річчю кафедри
«Теоретична механіка» ДонНТУ

КІНЕМАТИКА

Конспект лекцій англійською мовою

Затверджено на засіданні
Кафедри „Теоретична механіка".
Протокол № 9 від 19.02.2005

Затверджено учбово-методичною
радою ДонНТУ
Протокол № 1 від 14.03.2005

Донецьк - 2005

УДК 531(075.8)
Кінематика. Конспект лекцій для студентів усіх спеціальностей // Малєєв В.Б.., Ігнатов О.В., Блохін С.Е., Гордєєв Г.Г.// – Донецьк: ДонНТУ, 2005 – 60 с.

Відредаговано та видано укладачами

Конспект лекцій по теоретичній механіці (розділ „Кінематика") на англійській мові. Конспект лекцій призначено для студентів усіх спеціальностей.

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Contents

Introduction

This summary of the lectures is made by the authors on the foundation of the known references on theoretical mechanics /1-11/ and is intended for the students learning course of theoretical mechanics in English

Kinematics is the section of mechanics, which treats of the geometry of the motion of bodies without taking into account their inertia (mass) or the forces acting on them.

By motion in mechanics the relative displacement with time of a body in space with respect to other bodies is meant.

In order to locate a moving body (or particle) we assume a coordinate system, which we call the frame of reference or reference system, to be fixed relative to the body with respect to which the motion is being considered. If the coordinates of all the points of a body remain constant within a given frame of reference, the body is said to be at rest relative to that reference system. If, on the other hand, the coordinates of any points of the body change with time, the body is said to be in motion relative to the given frame of reference (and consequently, relative to a body which is fixed with respect to the frame of reference).

To describe the motion or the law of motion, of a given body (particle) kinematically means to specify the position of that body (particle) relative to a given frame of reference for any moment of time.

The principal problem of kinematics is that of determining all the kinematics characteristics of the motion of a body as a whole or of any of its particles (path, velocity, acceleration etc.) when the law of motion for the given body is known.