



1. Subject name	Vehicle system dynamics II.				
2. Subject name in Hungarian	Járműrendszerdinamika II.				
3. Code	BMEKOVJD008	4. Evaluation type	exam grade	5. Credits	4
6. Weekly contact hours	2 (0) Lecture	0 (0) Practice	0 (0) Lab		
7. Curriculum	PhD Programme	8. Role	Basic course		
9. Working hours for fulfilling the requirements of the subject					120
Contact hours	28	Preparation for seminars	30	Homework	0
Reading written materials	30	Midterm preparation	0	Exam preparation	32
10. Department	Department of Aeronautics and Naval Architectures				
11. Responsible lecturer	Dr. Zobory István				
12. Lecturers	Dr. Zobory István				
13. Prerequisites	recommended: BMEKOVJD007 - Vehicle system dynamics I.				
14. Description of lectures					
Characterisation of the connection forces arising between structural components. Force processes emerging in a damped linear vibratory system. The vibratory system, as a closed effect-chain system with feed-back. Bivariate continuous characteristic connection force surface in linear and nonlinear cases. Discontinuous connection force characteristic surfaces. Dry friction dampers. Taking into consideration the local elasticity. The effect of the sliding speed dependent friction coefficient on the characteristic surface. Deduction of the description of the force connection having short distance memory, for numerical applications. Treatment of the antedecent-dependence by an assembly of local planes. Defining a path-band on the motion-state plane. Equilibrium state on the local plane. Connection with the catastrophe theory. Double path-band on the motion-state plane. Non smooth dynamics. Examples for systems with friction connection. Time dependent (controlled) frictional limit-force. Conditional force-connections. Only compressive force transfer. Only tensile force transfer. Connection with backlash. Conditional connections working against each other. The effect of linear damping on the conformation of the conditional connection force. Introduction of the local elasticity. Conditional connection tightened against each other. Dynamics and tribology of rolling contacts. Traction arising on the contact surface. Stationary rolling in the presence of creep-dependent connection force. The Kalker-theory for the linearized connection force transfer. The five parameter non-linear function of the force connection coefficient. The naive stochastic model of the force connection coefficient. The force connection coefficient as a two parameter stochastic field. Semi-Markovian carrier process and a stationary fluctuation process as a function of the distance covered by rolling. Characterisation of the real contact conditions. Wear process of rolling connections. Relation between the dissipated energy-flow density and the debris mass-flow density. Wear simulation. Smoothing problems.					
15. Description of practices					
16. Description of laboratory practices					
17. Learning outcomes					
A. Knowledge B. Skills					
• Students must know comprehensively, interpret in a constructive way and apply in his research activities in an innovative way the following elements of analysis methods: the linear and non linear force connections of vehicle dynamical systems; description methods of the rolling connection; procedures describing the wear mechanism of the rolling connection.					
C. Attitudes D. Autonomy and Responsibility					
• Students must pursue to get knowledge of the new scientific results, the latter are applied with responsibility and initiates new resource activities in new fields of knowledge in an innovative way					
18. Requirements, way to determine a grade (obtain a signature)					
Regular participation at the lectures and written exam.					
19. Opportunity for repeat/retake and delayed completion					

According to the TVSZ.

20. Learning materials

1. Zobory, I.: Járműrendszerdinamika I. Kézirat. BME Vasúti Járművek és Járműrendszeranalízis Tanszék. Budapest, 2011.
2. Brown, F.T.: Engineering System Dynamics. Taylor & Francis, Boca Raton, London, New-York, 2007

Effective date	27 November 2019	This Subject Datasheet is valid for	Inactive courses
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