



Contemporary methods of dynamics and control of mechanical systems

Lecturer: prof. dr hab. inż. Krzysztof Kaliński (WM)

Content:

- 1. Modelling of controlled mechanical systems by the mixed method of rigid and flexible finite elements.**
The finite element volume problems. Dynamics of multibody systems. Modelling of stationary closed loop systems. Modelling of systems whose configuration changes with time. Modelling of nonlinear discrete systems.
- 2. Optimal control at energy performance index.**
Control of continuous and discrete linear nonstationary systems in domain of generalised and state coordinates. Control of nonlinear discrete systems. Motion control of 2-wheeled autonomous mobile platform. Vibration surveillance on a basis of the acceleration closed loop control.
- 3. Modal analysis.**
Modal energy participation. Modal control as a method of vibration surveillance. A frequency domain surveillance of the robot's structural vibration with the use of modal control at energy performance index. Optimal control in domain of hybrid coordinates.
- 4. Mechatronic solutions for a surveillance of high speed milling processes.**
Vibration surveillance during HSM with the use of variable spindle speed. Building the map of optimal spindle speeds during HSM of flexible details. Vibration surveillance during milling flexible details with the use of the active optimal control.
- 5. A concept of mechatronic design for a surveillance of dynamic systems.**
Tool-workpiece vibration surveillance in production processes supported by the mechatronic design. Mechatronic design of three wheeled mobile platform controlled by surveillance system at energy performance index. Virtual prototyping technique for predicting fatigue endurance of the vehicles.

References

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7. Kaliński K. J., Buchholz C.: Mechatronic Design of Strongly Nonlinear Systems on a Basis of Three Wheeled Mobile Platform. Mechanical Systems and Signal Processing 2015, 52-53, 700-721.
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Terminy wykładów			
Data	Dzień tyg.	Godzina	Sala
2015-10-19	Pn	9.15-14.00	WM 113
2015-10-21	Śr	9.15-14.00	WM 113
2015-10-23	Pt	9.15-14.00	WM 113