

Physics of Processes

Syllabus of lectures

Annotation:

Subject should give the basic overview of mathematical and experimental methods that are used in descriptions of processes. The subject is oriented to vibrations, waves and modern physics.

Topics of lectures

1. System, process, force, energy
2. Periodic processes, description, harmonic processes, Fourier's set
3. Free harmonic oscillating motion, linear harmonic oscillator, superposition and polarization of vibrations
4. Damped and forced harmonic oscillator, its energy, applications
5. Folding of oscillations, wave generation and propagation, wave equation, applications
6. Formation of standing waves, standing waves in strings, rods and other objects, energy
7. Alternate electric current, electromagnetic induction, oscillation circuit
8. Electromagnetic waves, application of results obtained at mechanical waves
9. Introduction to modern physics
10. Nuclear energy - nuclear fission
11. Nuclear energy - nuclear fusion
12. Fundamental changes of systems - growth functions and kinetic equations, survival curves

Literature:

Blackstock, D.T.: Fundamentals of physical acoustics. John Wiley, New York 2000, 542 p.

Crawford, F.S., Jr.: Waves. Berkeley Physics Course, Vol. 3, McGraw-Hill College, New York, 1968

Daniels, F., Alberty, R.A.: Physical Chemistry. J. Wiley & Son, Inc., New York 1987, 944 p.

Halliday, D., Resnick, R., Walker, J.: Fundamentals of Physics, Sixth Edition. Wiley International Edition, John Wiley & Sons, 2001

https://en.wikipedia.org/wiki/Complex_number

Li, Feng-ri; Zhao, Bao-Dong; Su, Gui-lin: A derivation of the generalized Korf growth equation and its application. Journal of Forestry Research 11 (2000), p. 81-88.

Pain, H.J.: The Physics of Vibrations and Waves, John Wiley and Sons Chichester, 2005

Skudrzyk, E.: Simple and Complex Vibrating Systems. The Pennsylvania State University Press, University Park 1969, 500 p.

Wiley, R.B., Stewart, W.E., Lighthfoot, E.N.: Transport Phenomena. John Wiley and Sons Chichester, 2002

Yamamoto, H., Haginuma, S. 1984. Estimation of the dynamic Young's modulus of apple flesh from natural frequency of an intact apple. Report National Food Research Institute, 44, p. 30-35.