

Shock Waves and Acoustical Phenomena

Unit Title	Shock Waves and Acoustical Phenomena.		
Level of Study			
Credit Value		ECTS Value	
Home Department	Department of Theoretical Physics.		
Home Faculty	Physics Faculty.		
Unit Co-ordinator	Vitaly A. Demin		
Key Words	The sound waves; spherical and cylindrical waves; general solution of the wave equation; the shock waves; non-linear waves.		
Brief Summary	<ul style="list-style-type: none"> -the sound waves; -energy and momentum of sound waves; -reflection and refraction of sound waves; -geometrical acoustics; -propagation of sound in a moving medium; -spherical and cylindrical waves; -general solution of the wave equation; -the shock waves; -the direction of variation of quantities in a shock wave and oblique shock wave; -non-linear waves. 		
Indicative Content	<p>The classical themes of acoustics are considered like the sound waves; energy and momentum of sound waves; reflection and refraction of sound waves; geometrical acoustics; propagation of sound in a moving medium; spherical and cylindrical waves; general solution of the wave equation.</p> <p>One more part of the course is represented by the shock waves topic. This theme consists of</p> <p>propagation of the disturbances in a moving gas; analysis of the steady flow of a gas with the trans-sonic velocity; derivation of the equation of shock adiabatic; analytical description of weak shock waves.</p> <p>Also the direction of variation of quantities in a shock wave and oblique shock wave are discussed. The thickness of a shock wave is determined on the base of general principles.</p>		

	<p>The third part of the course deals with non-linear waves. Burgers equation is derived from non-linear gaseous dynamics equations with the help of multi-scale method. The exact solution Burgers equation in the form of shock wave is analyzed. Other standard non-linear equations like the Korteweg de Vries one or Langmuir equation are derived and discussed concerning to the physics of plasma.</p>
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