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RESEARCH OF ACOUSTIC EMISSIONS DURING THE LAUNCH OF A SPACE ROCKET

Abstract

It is known that when space rockets (ILV) are launched, acoustic fields of various types of radiation and power are generated in the atmosphere. The relevance of the research topic for such radiations is determined by the need to assess the levels of their sound pressure both near the shells of missile parts and at a distance from the launch site. The level of modern theories of classical acoustics makes it possible to reveal the features and determine the directions of research of acoustic radiation of this type. The basis can be based on existing ideas about the generation and distribution of sound. It is necessary to develop physical models of acoustic fields, the nature of which depends primarily on the type of acoustic sources. The purpose of this work is to develop a method for determining the types of acoustic sources of radiation and their acoustic fields during the space rockets launch. In the first seconds it is based on the wave parameter values. The main noise source during the space rocket launch is its propulsion system (PS). The cross-section of the nozzle is taken as the oscillation source. The theory of sound radiation is based on calculating the acoustic power of a jet as a volumetric sound emitter or a volumetric emitter. Mathematical dependences will make it possible to analyze the relationship between the acoustic radiation sources energy characteristics and the characteristics of their acoustic fields. The front of a spherical wave is a spherical surface. As a result of the divergence of the waves, the sound intensity decreases with distance from the source according to the quadratic law. It is important to calculate the acoustic radiation amplitude-frequency characteristics. The next step is the creation of mathematical models designed to calculate the acoustic field characteristics (analytical methods, the use of Taylor and Fourier series, numerical programming methodsExperimental tests, the development of programs, and methods for measuring the acoustic vibration characteristics are important. At the same time, a list of equipment necessary for measuring acoustic characteristics (instruments, circuits, equipment) is created. As a result of physical and mathematical analysis of acoustic vibrations sources, it is possible to develop active and passive methods of damping them. As well as giving recommendations for damping acoustic vibrations. The present work has a prospective character for clarifying the nature of the acoustic fields and for calculating the noise levels from the space rocket launch when designing the cosmodromes. In the requirements for the construction of such structures, the noise impact on the environment of infrasound radiation upon launching launch vehicles is identified.