

Dynamic analysis of cone waveguide for ultrasonic assisted technological processes

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The new modern materials (ceramics, composites and others) developed for specific applications are generally characterized by improved mechanical properties. As a result, it is clear that this situation leads to relatively large problems in their technological processing. For this reason, the hybrid technology processes are used to process these materials, in which the combination of conventional technological processes with ultrasonic vibrations is used. The transmission of vibrations into the technological process [2] is performed by means of the so-called ultrasonic horn, which has to vibrate only in resonant mode. Design and analysis of cone ultrasonic horn with adaptive change of modal properties is solved in this paper. Modification of modal properties [1], [3] is carried out using an embedded core. By the change of dimensions, position and material properties of core, the distribution of the spatial properties of horn structure are modified. The dependence of modal properties (mode shapes and natural frequencies) on the dimension parameters and material properties of core using the numerical simulations by finite element method are investigated in this paper.

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