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CONSTRUCTION OF 3D PARAMETRIC MODELS OF THE LPRE NOZZLE HEAD

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The possibility of creating parametric models will undoubtedly speed up the process of creating a new and upgrading the existing design of the LPRE nozzle head in the shortest possible time.

Considering the design of the nozzle head of the LPRE prototype without afterburning the generator gas, the following main structural elements can be distinguished: fire and middle bottoms, nuclear and wall-mounted injectors, outer shell, strong ring and output flange.

In this paper, we considered a prototype with a concentric arrangement of nuclear two-component centrifugal nozzles, a spherical outer shell, a round output flange and a cylindrical strong ring [1].

The parametric models of fire and middle bottoms developed in the ADEM VX software environment allow changing the number of circles and their radii, on which the nozzle elements are located, and the dimensions by which the bottoms are connected to the mating structural elements.

The parametric model of the centrifugal-centrifugal nozzle has a design with a closed inner twisting chamber and an open outer one, with the ability to change the number and diameter of the input tangential holes.

The parametric model of the outer shell can vary by the diameters of the base and output sections, by the outer radius and wall thickness.

The output flange can be changed according to the flow section and the output flange diameter.

The created parametric models are modified individually and then assembled into a single unit.

Hence, it is possible to continue this work and create more complex parameterization tools such as macros and tables, with which you can change the design of the nozzle head as a whole, changing one of the design size of the element that is part of it.

References

1. Egorychev V.S. Calculation and design of mixture formation in a liquid-propellant rocket engine [Tutorial]. Samara: SSAU Publishing House, 2011. 100 p.