CFD ANALYSIS OF INTERACTION OF THE FLUID STRUCTURE OF THE CONVERGENT-DIVERGENT NOZZLE

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Abstract: In the present work, a convergent-divergent nozzle is aerodynamically designed. The structural loads of the fluid flow nozzle and the temperature of the fluid in it. Initially, the CFD simulation is performed with thermal considerations in the NPR range of the nozzle. Furthermore, the CFD result is used as a load in the nozzle structural analysis. Nozzle is working in the NPR range in its NPR design service. The maximum load on the nozzle structure can occur at any NPR flow value. The problem associated with the design of the nozzle structure is the prediction of the load at various nozzle pressure ratio intervals. It is difficult to find and solve this problem analytically. Experimentation will lead to a more expensive investigation. Therefore, a calculation method is needed to find the load in different NPRs. The maximum load of the CFD simulation is used for structural simulation to complete the nozzle thickness. The interaction of the fluid structure (FSI) is the interaction of some mobile or deformable structures with an internal or surrounding fluid flow. The interaction fluid structure can be stable or oscillatory. The problems of interaction of the fluid structure and the problems of multi physics in general are often too complex to be solved analytically; therefore they must be analyzed by means of experiments or numerical simulations.

IndexTerms - FSI, Computational Fluid Dynamics, Structural Simulation

I. INTRODUCTION

Food-Structural Interaction (FSI) is the interaction of a structure that can be changed and has a fluid flow inside or around. Food aluminum reactions can be stable or shaken. In the transition of the cradle, caused by strong structures, it moves, so that the source of the pressure is reduced and the structure returns to its former state to repeat. The structural interaction of food is important in the design of many engineering systems. Aircraft and bridges. The inability to think about the effects of interaction can be particularly disastrous, especially in structural structures related to fatigue-related materials. The Tacoma Narrows Bridge (1940), the first Tacoma bridge, is perhaps one of the major failures. The plane and the wagons can be split due to variations in FSI. Relation with the structure of the fluid should be considered in the arterial analysis of arterioles and artificial neurons. Reed actually produces sound because the system of its dynamic management equation has cradle solutions. The potential of the pipe holes used in two engines and chainsaws is controlled by the FSI. The act of "green flax" is another example. Will suffer from suffocation, which will be part of the expansion to atmospheric pressure that arises after the throat flow (for example, the smallest flux) into the flow of the aircraft. Although the flow does not stay strong, the balance between throat pressure and atmospheric pressure still creates some pressure.

Newton's approach or Raphson-another fixed point can be used to solve PLP problems. The Newton-Raphson-based approach used in this approach is solid and divide both. These approaches are solutions of straight equations and flow throughout the structure of