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Gaseous imperfections effect on the supersonic flow parameters for air in nozzles

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When the stagnation pressure of a perfect gas increases, the specific heat and their ratio do not remain constant anymore and start to vary with this pressure. The gas doesn't remain perfect. Its state equations change and it becomes for a real gas. In this case, the effects of molecular size and intermolecular attraction forces intervene to correct the state equations. The aim of this work is to show and discuss the effect of stagnation pressure on supersonic thermo-dynamical, physical and geometrical flow parameters, to find a general case for real gas. With the assumptions that Berthelot's state equation accounts for molecular size and intermolecular force effects, expressions are developed for analyzing supersonic flow for thermally and calorically imperfect gas lower than the dissociation molecules threshold. The designs parameters for supersonic nozzle like thrust coefficient depend directly on stagnation parameters of the combustion chamber. The application is for air. A computation of error is made in this case to give a limit of perfect gas model compared to real gas model.

Biography

Merouane Salhi enrolled at the Institute of Aeronautics and Space Studies at Blida University in 2002. In 2007, he earned a State Engineer degree in Aeronautical Propulsion. When he enrolled at the same institute, in 2010, he earned his Magister in Aeronautical Engineering. He joined Cosider Group in 2010, becoming a Mechanical Engineer. He stayed in that position six months, after that he joined the Institute of Aeronautics and Space Studies at Blida 1 University in 2011. He became an Assistant Professor of Aerodynamics and Propulsion. He also served as an Affiliate Member of the Aeronautical Sciences Laboratory at Blida University. He works on Aerodynamics and Propulsion Systems. He also teaches Mathematics, Mechanics, Electricity, Vibrations and waves, Materials Resistance and Aerodynamics at Blida University. He has some publications on aerodynamics and nozzle.

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