

## 2<sup>nd</sup> International Conference and Exhibition on Mechanical & Aerospace Engineering

September 08-10, 2014 Hilton Philadelphia Airport, USA

## Simulation and validation on vapor core in the impeller center of vapor core pump

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Vapor core pump is a centrifugal pump with inlet throttle valve, under some conditions there exist closed gas phase region in the center of impeller. Vapor core pattern and size are decisive factors affecting performances of the pump. In order to study formation and evolution law of the vapor core in the center of impeller covering the whole operating range, the renormalization group (RNG) k-epsilon two-equation turbulence model was applied in this paper, the fuel vapor core pump with radial straight blades is overall modeled and numerically simulated in three dimensions. Partial experimental data of the vapor core pump prototype validates the reliability and precision of the numerical model. Under the same conditions, difference of the flow rate-head characteristics between numerically simulation and physical test does not exceed 10%. On this basis, influences on the scale of vapor core by the inlet throttle valve opening, rotation speed, blade width at the outlet as well as the effects on vapor core pump performance are analyzed. Results show that, load at the pump outlet has different influence on vapor core. Within a certain range of rotation speed and at the same inlet throttle valve opening, the higher the impeller rotation speed is, the greater the radius of vapor core is. When vapor core is stable, load fluctuations at the pump outlet has little effects on the fuel flow rate, more stable than a centrifugal pump with the same specifications.

## **Biography**

Bin Wang is a Lecturer at Jiangsu Province Key Laboratory of Aerospace Power Systems, College of Energy and Power Engineering, Nanjing University of Aeronautics and Astronautics in China. He received his Doctor's degree from Zhejiang University in 2009 and his research area was hydraulic pumps. His Postdoctoral research was done at the Post-Doctoral Research Station of aerospace science and technology from 2009 to 2012. Now his research interests are aviation hydraulic system and components, especially aviation auxiliaries like fuel pumps in aero-engines.

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