Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Development of Hydrodynamic Flow Control using Combined Hydrophobic and Hydrophilic Coatings and Micelle Polymer HIROTAKA SAKAUE, KATSUAKI MORITA, JAXA, TSUYOSHI HYAKUTAKE, HIROYUKI NISHIDE, Waseda University — Development of hydrodynamic flow control using combined hydrophobic/hydrophilic coatings and micelle polymer is discussed. The former is developed for a passive flow control, while the latter for an active flow control. First, a passive flow control of this method is shown by applying hydrophobic and hydrophilic coatings separately on a control surface. Drop tests of an ogive shape model in water tower show that the resultant coating varies the drag coefficient, indicating the ability to control the speed. In the final version, hydrophobic and hydrophilic coatings will be separately applied parallel to the dropping direction to demonstrate the direction control using this method. Second, as an active flow control, a temperature-sensitive micelle polymer of poly(isopropyl acryl amide) [poly(NiPAAm)] is shown. This polymer is hydrophobic over the critical temperature of 32°C, while it is hydrophilic below the critical temperature. In the final version, this polymer will be applied to the model surface to demonstrate the capability of an active flow control.

Hirotaka Sakaue
JAXA

Date submitted: 05 Jul 2007 Electronic form version 1.4