Gas-Liquid Two Phase Flow Behavior Related to ECLSS

Report Number: R24ECWU77
Subject Category: Cooperative Graduate School System
URL: https://www.jss.jaxa.jp/en/ar/e2024/27342/

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Abstract

Elucidate the effects of gravity on gas-liquid two-phase flows to develop separation techniques for gas-liquid two-phase flows generated by the operation of the Environment Control and Life Support System (ECLSS).

Reasons and benefits of using JAXA Supercomputer System

To establish gas-liquid separation technology, it is necessary to evaluate the interfacial behavior of gas-liquid two-phase flows under the influence of gravity. Large-scale and high-speed numerical simulations are essential for conducting this research on Earth, and the vast computational resources provided by JSS are crucial.

Achievements of the Year

In order to investigate the effect of surface properties in a container on gas-liquid two-phase flow, the behavior of gas-liquid two-phase flow in a sealed container with hydrophobic wall surfaces was examined. It was found that the hydrophobic wall surface suppressed the liquid behavior more than the hydrophilic wall surface.(Figure 1)

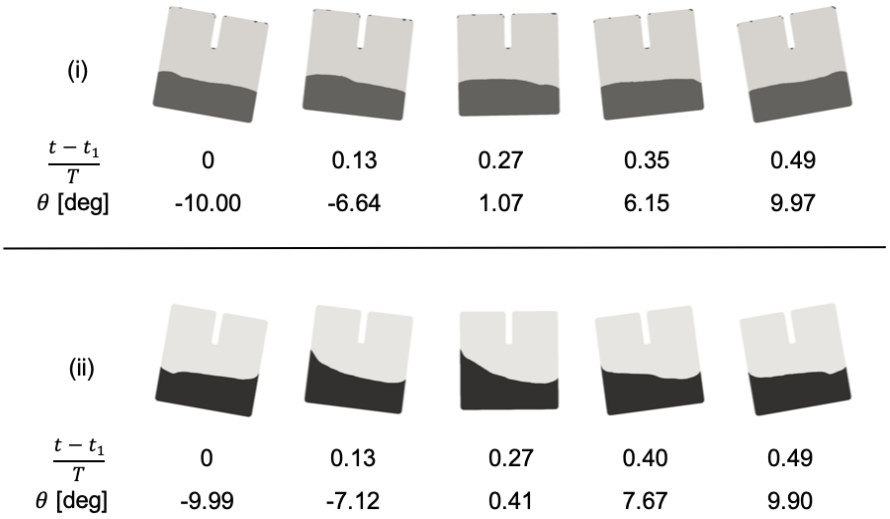

Fig. 1: Liquid behavior in containers with different wall wettability (i) hydrophobic model (ii) hydrophilic model

Publications

- Oral Presentations

Effect of gravity conditions on Sloshing Phenomena in Sealed Vessel

Usage of JSS

Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	144 - 324
Elapsed Time per Case	24 Hour(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.04

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	0.00	0.00
TOKI-ST	155,959.12	0.16
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage[*2] (%)
/home	245.00	0.17
/data and /data2	155,985.00	0.75
/ssd	33,230.00	1.78

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[*2] (%)
J-SPACE	2.73	0.01

[*1]: Fraction of Usage in Total Resources: Weighted average of three resource types (Computing, File System, and Archiver).

[*2]: Fraction of Usage：Percentage of usage relative to each resource used in one year.

- **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage[*2] (%)
ISV Software Licenses (Total)	0.00	0.00

[*2]: Fraction of Usage：Percentage of usage relative to each resource used in one year.