Patterns of a slow air-water flow in a semispherical container - DTU Orbit (08/11/2017)

Patterns of a slow air-water flow in a semispherical container

This numerical study analyzes the development of eddies in a slow steady axisymmetric air-water flow in a sealed semispherical container, driven by a rotating top disk. As the water height, Hw, increases, new flow cells emerge in both water and air. First, an eddy emerges near the axis-bottom intersection. Then this eddy expands and reaches the interface, inducing a new cell in the air flow. This cell appears as a thin near-axis layer which then expands and occupies the entire air domain. As the disk rotation intensifies at Hw = 0.8, the new air cell shrinks to the axis and disappears. The bulk water circulation becomes separated from the interface by a thin layer of water counter-circulation. These changes in the flow topology occur due to (a) competing effects of the air meridional flow and swirl, which drive meridional motions of opposite directions in water, and (b) feedback of water flow on the air flow. In contrast to flows in cylindrical and conical containers, there is no interaction with Moffatt corner vortices here.

General information

State: Published
Organisations: Department of Applied Mathematics and Computer Science , Mathematics , Office for Study Programmes and Student Affairs, Universidad de Sevilla, Shtern Research and Consulting
Authors: Balci, A. (Intern), Brøns, M. (Intern), Herrada, M. A. (Ekstern), Shtern, V. N. (Ekstern)
Pages: 1-8
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: European Journal of Mechanics B - Fluids
Volume: 58
ISSN (Print): 0997-7546
Ratings:

BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.808 SNIP 1.416 CiteScore 2.07
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.8 SNIP 1.46 CiteScore 1.75
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.788 SNIP 1.63 CiteScore 1.8
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.87 SNIP 1.558 CiteScore 1.79
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.954 SNIP 1.655 CiteScore 1.86
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.741 SNIP 1.526 CiteScore 1.61
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.959 SNIP 1.484
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.121 SNIP 1.534
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.917 SNIP 1.348
Scopus rating (2007): SJR 0.943 SNIP 1.151
Scopus rating (2006): SJR 1.227 SNIP 1.4
Scopus rating (2005): SJR 1.348 SNIP 1.416
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.888 SNIP 1.284
Scopus rating (2003): SJR 1.182 SNIP 0.805
Scopus rating (2002): SJR 0.972 SNIP 1.057

Scopus rating (2001): SJR 1.806 SNIP 1.083
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.206 SNIP 0.854
Scopus rating (1999): SJR 1.077 SNIP 0.905
Original language: English
Swirling motions, Two-fluid flows, Viscous incompressible fluids, Sealed container, Changes in flow topology
DOIs:
10.1016/j.euromechflu.2016.03.004
Source: FindIt
Source-ID: 2303146024
Publication: Research - peer-review › Journal article – Annual report year: 2016