Applied Research Project L2-1825

Modelling of Trapped Air Pockets in Hydraulic Piping Systems

Ljubljana, 2019-2023

Planed date for the start of the project: July 1, 2019

Target date for the realization of the project: June 30, 2023

Participating research organizations from the ARRS research organizations database

Code number	Name	
2836	LITOSTROJ POWER, družba za projektiranje, gradnjo elektrarn in izdelavo energetske ter industrijske opreme, d.o.o.	67 %
782	Univerza v Ljubljani, Fakulteta za strojništvo	33 %

Funding of the project:

(1) ARRS, Slovenian Research Agency: 75%
(2) Litostroj Power d.o.o.: 25%

Work Packages (WP):

WP0 Project coordination

WP1 Review of existing models

WP2 Analysis of experimental data

WP3 Standard discrete gas cavity model

WP4 Distributed gas cavity model

WP5 Combined gas cavity model

WP6 Report and dissemenation

WP0 Project coordination

Litostroj Power d.o.o., Ljubljana (herein LP): duration-month 1-36

Date: 01.07.2019-30.06.2022

Note: Herein the organization stated at the beginning is the WP leader.

WP1 Review of existing models

LP, Faculty of Mechanical Engineering, Ljubljana (herein FS):

duration-month 1-4

Date: 01.07.2019-31.10.2019

WP1 Tasks:

1.1: Review of the development of existing air pocket models in unsteady liquid pipe flow

1.2: Critical comparison of existing models

WP2 Analysis of experimental data

LP: duration-month 2-10

Date: 01.08.2019-30.04.2020

WP2 Tasks:

2.1: Analysis of performed measurements in a small-diameter pipeline apparatus (Adelaide and Podgorica apparatuses)
2.2: Selection of distinct experimental runs in a small-diameter pipeline apparatuses for validity study
2.3: Analysis of performed measurements in a large-diameter pipeline apparatus (Delft apparatus)
2.4: Selection of distinct experimental runs in a large-diameter pipeline apparatus for validity study

WP3 Standard discrete gas cavity model

FS, LP: duration-month 4-16

Date: 01.10.2019-31.10.2020

WP3 Tasks:

3.1: Development of unsteady pipe flow and discrete gas cavity equations

3.2: Development of a method of charateristics numerical algorithm with discrete gas cavities

3.3: Development of computer code

3.4: Convergence and stability of the developed model

3.5: Validation of discrete gas cavity model with measurements

WP4 Distributed gas cavity model

LP, FS: duration-month 11-24

Date: 01.05.2020-30.06.2021

WP4 Tasks:

4.1: Development of extended unsteady pipe flow and gas column equations

4.2: Development of a method of charateristics numerical algorithm with gas columns

4.3: Development of computer code

4.4: Convergence and stability of the developed model

4.5: Validation of distributed gas cavity model with measurements

WP5 Combined gas cavity model

LP, FS: duration-month 21-33 ⟶ 41

Date: 01.03.2021-31.12.2022

WP5 Tasks:

5.1: Development of extended unsteady pipe flow and gas cavity equations

5.2: Development of a method of charateristics numerical algorithm with discrete gas cavities and gas columns

5.3: Development of computer code

5.4: Convergence and stability of the developed model

5.5: Validation of combined cavity model with measurements

WP6 Report and dissemenation

LP, FS: duration-month 6-36 → 48

Date: 01.12.2019-30.06.2023

WP6 Tasks:

6.1: Preparation of the final report

6.2: Dissemination of the results