SPECIAL SESSION: TRANSIENTS IN PIPES

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SILVIA MENICONI[(1)] & MOEZ LOUATI[(2)]

[(1)] Dept. Civil, Environmental Engineering, The University of Perugia, Perugia, Italy.
email: silvia.meniconi@unipg.it

[(2)] Dept. Civil, Environmental Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, China
email: mzlouati@gmail.com

PREFACE

This *unofficial* volume contains the eighteen full papers submitted to the Special Session "Transients in Pipes", within the 38th IAHR World Congress, held in Panama City (Panama), September 1-6 2019.
The Special Session was established in 2017 in Kuala Lumpur, and we hope it will become a well-established series of bi-annual meetings.
In the following, the papers submitted to the Special Session will be briefly described.
After the inspiring keynote lecture given by Professor Bryan Karney (Figure 1) of the University of Toronto who discusses the most convenient approach for simulating the dynamic behaviour of a pressurized pipe system, the first part of the session is focused on the fault detection by means of transients in a transmission main (Figure 2). Specifically, the paper presented by Bruno Brunone illustrates the possible methods for generating suitable transients for a reliable diagnosis of transmission mains. The paper presented by Silvia Meniconi stems from the need of maintaining the system regular functioning in a real transmission main and shows the results of transient tests executed at the Water Engineering Laboratory of the University of Perugia, Italy for different initial conditions. In Muhammad Waqar et al. paper leak localization in the presence of measurement noise using time-reversal technique is proposed and tested numerically. The paper presented by Jessica Bohorquez deals with a non-dimensional transformation of transient pressure traces in a damaged pipe that can be useful for the development of leak location techniques to avoid the requirement of knowledge of the specific characteristics of the system.

Figure 1. The Special Session "Transient in Pipes", during the keynote lecture given by Professor Bryan Karney of the University of Toronto.

The second part of the Special Session (Figure 3) consists of five papers, which show the behaviour of the entrapped air pockets during a transient event. Specifically, after the laboratory and numerical study on violent geysers in a vertical pipe presented by Arturo Leon, the paper Juliana Kaiber da Silva et al. illustrates preliminary results of an experimental investigation concerning the motion of air pockets through a geometrical singularity. Moreover, the paper presented by Musandji Fuamb compares the performance of a shock-fitting approach – in which the free surface Saint-Venant equations with the rigid column model are implemented to simulate the air pocket entrapment in a closed-conduit transient flow – with other approaches of previous studies. Furthermore, the paper presented by Ling Zhou investigates the effects of unsteady friction in a rapid filling pipeline with an entrapped air pocket. Finally, Didia Covas shows a huge amount of experimental tests

carried out at the Laboratory of Hydraulics and Environment (LHE) of Instituto Superior Técnico (IST), Lisbon, Portugal to investigate the effect of an entrapped air pocket in the transient pressure wave propagation.

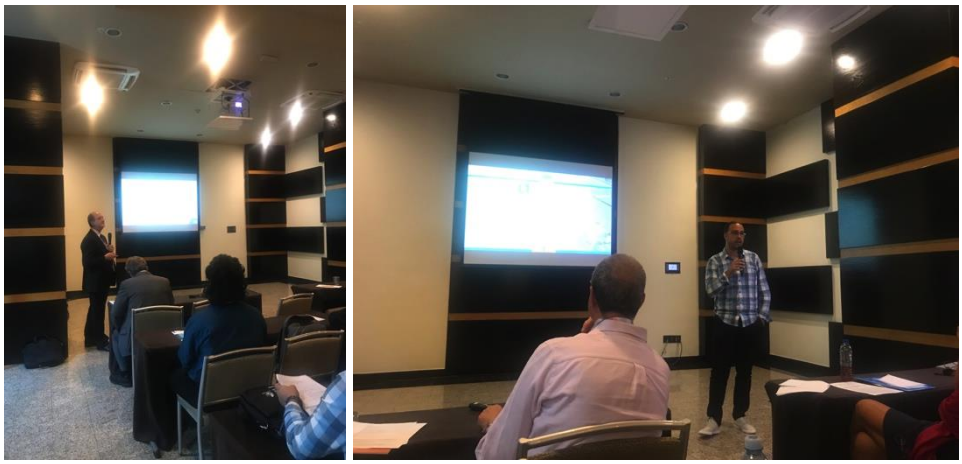

Figure 2. Some speakers of the first part of the Special Session “Transient in Pipes” on fault detection.

Figure 3. The speakers of the second part of the Special Session “Transient in Pipes” on fault detection.

The third part of the Special Session (Figure 4) highlights the fluid structure interaction. Particularly, the paper presented by Daiki Sakamoto shows the measurements of seismic acceleration and hydrodynamic pressure in the pipeline of the Kasumigaura Water Facilities in Ibaraki prefecture, Japan, along with a 1D flow analysis of the measured seismic acceleration. Then, the paper presented by David Ferras aims at providing further insight in the problem of fluid-structure interaction during steady-oscillatory flows considering the axial pipe vibration constrained by different anchoring conditions in a marine outfall exposed to sea waves. Finally, the work presented by Georgios Grigoropoulos uses high frequency acoustic waves for fault detection in a pipeline. Specifically, the experimental tests executed in the hydraulics laboratory at the Hong Kong University

of Science and Technology are compared with an approximate analytical, impedance based, model that describes wave propagation in fluid filled elastic pipes.

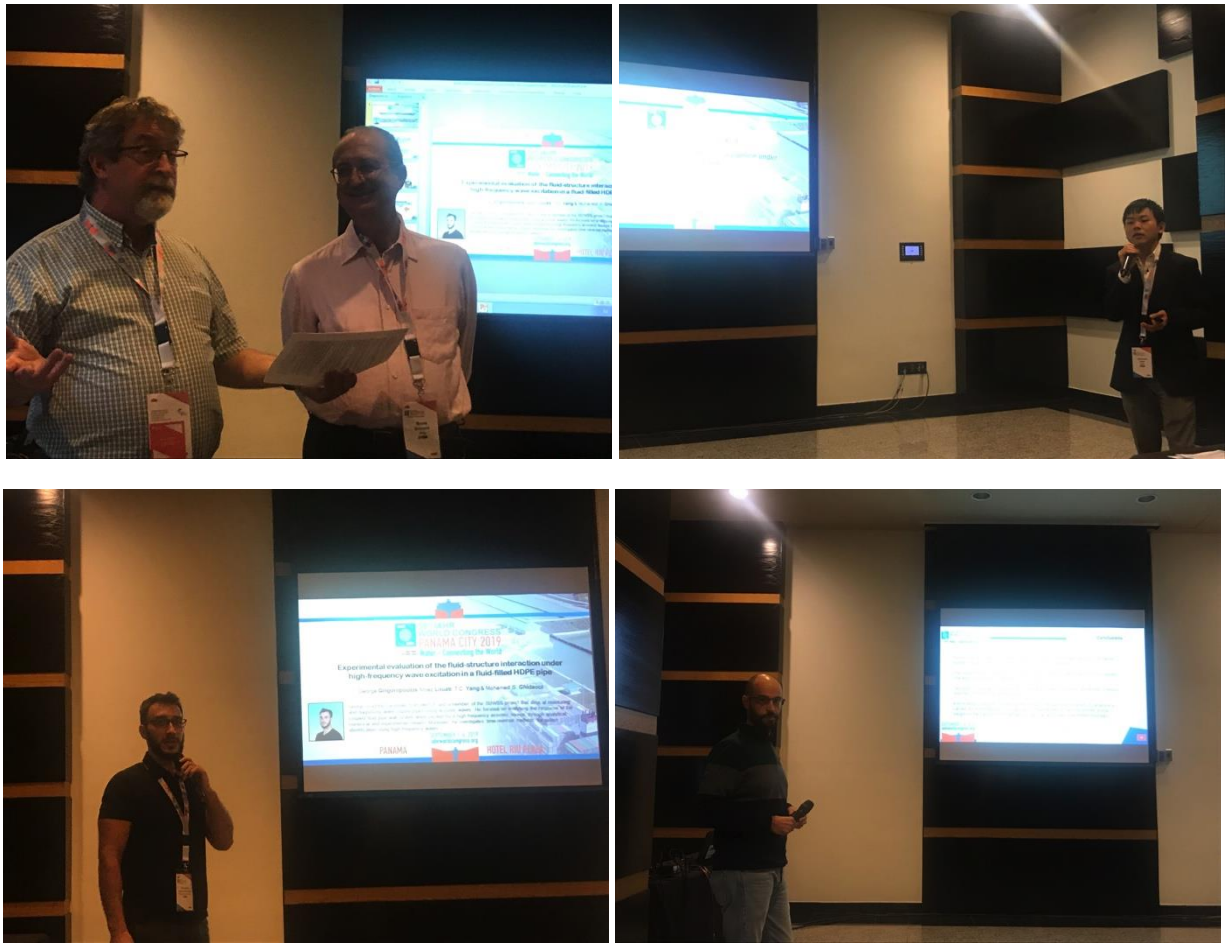

Figure 4. The chairmen and speakers of the third part of the Special Session “Transient in Pipes” on fluid structure interaction.

In the fourth part of the session two papers concern the dynamic behaviour of a real water distribution system: specifically, the pressure traces acquired in a real water network in Italy presented by Valentina Marsili show both short-term and long-term pressure fluctuations: the first ones are due to the user demand, whereas the second ones are related to the network geometry and characteristics; the M. Y. Lam et al. paper tries to characterized statistically the pressure fluctuations registered in a water network in Hong Kong.
The last three papers of the Special Session investigate the devices and methodologies to protect the system against water hammer. In particular, the research of Venkata Rathnam Erva presents the cost comparison of different transient suppression devices for five water-pumping systems in South India. In the paper presented by Elias Tasca a multiple-criteria decision analysis is applied to select an adequate protection system for a test pipeline subject to a pump trip. In the last paper presented by Bryan Karney, after identifying the set of critical nodes that will result in the worst case transient loading condition, the identification of the optimal pipe sizes that simultaneously minimize cost and the likelihood of damaging transient events is carried out by combining a non-dominated sorting genetic algorithms with transient analysis.

An important contribution to the success of the event was given by the stimulating discussion launched by chairmen of the special session: Didia Covas, Ling Zhou, Bruno Brunone, Bryan Karney, Arturo Leon and David Ferras.

With some fun and convivial moments taken during the coffee breaks and the Gala Dinner (Figure 6), we invite you in Granada, Spain for the 3rd edition of the Special Session “Transients in Pipes” during the 40th IAHR World Congress in 2021.

Figure 5. Some speakers of the fourth and fifth parts of the Special Session “Transient in Pipes” on the dynamic behaviour of a real network and methods to protect the system against water hammer.

Figure 6. Coffee breaks and Gala Dinner.

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