

# Accepted Manuscript

Experimental validation of heat transport modelling in district heating networks

K. Sartor, P. Dewallef

PII: S0360-5442(17)30344-4

DOI: [10.1016/j.energy.2017.02.161](https://doi.org/10.1016/j.energy.2017.02.161)

Reference: EGY 10454

To appear in: *Energy*

Received Date: 14 September 2016

Revised Date: 31 January 2017

Accepted Date: 1 February 2017

Please cite this article as: Sartor K, Dewallef P, Experimental validation of heat transport modelling in district heating networks, *Energy* (2017), doi: 10.1016/j.energy.2017.02.161.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



1 Experimental validation of heat transport modelling in  
2 district heating networks.

3 K Sartor<sup>a</sup>, P. Dewallef<sup>a</sup>,

4 <sup>a</sup>*Aerospace and Mechanical Engineering Department - Laboratory of Thermodynamic and*  
5 *Energetic, University of Liège, 17 Allée de la découverte, 4000 Liège, Belgium*

---

6 **Abstract**

7 District heating networks (DHN) are generally considered as a convenient,  
8 economic and environmental-friendly way to supply heat to a large amount  
9 of buildings. Some modelling methods are required to consider the dynamic  
10 behaviour of district heating networks to design them correctly, spare the  
11 investment costs and limit the heat losses related to the use of a too high  
12 operating temperatures. For the same reasons, the DHN control or retrofit  
13 of installations also requires the assessment of the DHN dynamic behaviour.  
14 To achieve this, the heat transport in DHN, which is one of the key issues  
15 in the behaviour of a whole centralized heating system, has to be correctly  
16 modelled. Previous work evidenced current limitations of one dimensional  
17 finite volume method to model heat transport in pipes and proposed an  
18 alternative method considering the thermal losses and the inertia of the pipes.  
19 The present contribution intends to experimentally validate this model on a  
20 test rig available at the Thermodynamics laboratory of the University of  
21 Liège (ULg, Belgium) and on an existing district heating network. For both  
22 experimental facilities, the current model shows good agreement between  
23 the experimental data and the simulation results for a large range of water  
24 velocities. Moreover, it is shown that the thermal inertia of the pipe has a  
25 significant influence on the outlet pipe temperature profile.

26 *Keywords:* District Heating Network, DHN, pipe, dynamic simulation,  
27 heat transport, experimental validation.

---

28 **1. Introduction**

29 District heating networks (DHN) appeared in Europe since the 14<sup>th</sup> cen-  
30 tury (in France) [1] and they have been developed since 1950 [2]. Nowadays,

Download English Version:

<https://daneshyari.com/en/article/8072806>

Download Persian Version:

<https://daneshyari.com/article/8072806>

[Daneshyari.com](https://daneshyari.com)