## Accepted Manuscript

Treating network junctions in finite volume solution of transient gas flow models

Alfredo Bermúdez, Xián López, M. Elena Vázquez-Cendón

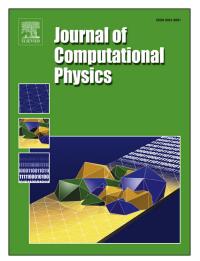
 PII:
 S0021-9991(17)30354-6

 DOI:
 http://dx.doi.org/10.1016/j.jcp.2017.04.066

 Reference:
 YJCPH 7332

To appear in: Journal of Computational Physics

Received date:20 December 2016Revised date:10 April 2017Accepted date:26 April 2017



Please cite this article in press as: A. Bermúdez et al., Treating network junctions in finite volume solution of transient gas flow models, J. Comput. Phys. (2017), http://dx.doi.org/10.1016/j.jcp.2017.04.066

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.

### ACCEPTED MANUSCRIPT

## Treating network junctions in finite volume solution of transient gas flow models

Alfredo Bermúdez<sup>a,b</sup>, Xián López<sup>a,b</sup>, M. Elena Vázquez-Cendón<sup>a,b,\*</sup>

<sup>a</sup>Departamento de Matemática Aplicada, Universidade de Santiago de Compostela, 15706 Santiago de Compostela, Spain <sup>b</sup>ITMATI, Campus Sur, 15706 Santiago de Compostela, Spain

#### Abstract

A finite volume scheme for the numerical solution of a non-isothermal non-adiabatic compressible flow model for gas transportation networks on non-flat topography is introduced. Unlike standard Euler equations, the model takes into account wall friction, variable height and heat transfer between the pipe and the environment which are source terms. The case of one single pipe was considered in a previous reference by the authors, [8], where a finite volume method with upwind discretization of the flux and source terms has been proposed in order to get a well-balanced scheme. The main goal of the present paper is to go a step further by considering a network of pipes. The main issue is the treatment of junctions for which container-like 2D finite volumes are introduced. The couplings between pipes (1D) and containers (2D) are carefully described and the conservation properties are analyzed. Numerical tests including real gas networks are solved showing the performance of the proposed methodology.

*Keywords:* Gas flow in networks, nonlinear hyperbolic systems with sources, junctions, finite volume method, well-balanced schemes.

#### 1. Introduction

In this paper a finite volume method is proposed to solve the equations modelling the gas flow in gas transportation networks consisting of pipelines interconnected at nodes and some other elements like compression stations, pressure/flow

Preprint submitted to Journal of Computational Physics

<sup>\*</sup>Corresponding author.

Email addresses: alfredo.bermudez@usc.es (Alfredo Bermúdez),

lopezalvarez.xian@gmail.com (Xián López), elena.vazquez.cendon@usc.es (M. Elena Vázquez-Cendón)

Download English Version:

# https://daneshyari.com/en/article/4967450

Download Persian Version:

https://daneshyari.com/article/4967450

Daneshyari.com