Politechnika Warszawska

WYDZIAŁ INSTALACJI BUDOWLANYCH, HYDROTECHNIKI I INŻYNIERII ŚRODOWISKA

Zakład Systemów Ciepłowniczych i Gazowniczych

Praca dyplomowa magisterska

na kierunku Inżynieria Środowiska
w specjalności Inżynieria Gazownictwa

Efektywne metody numeryczne rozwiązywania równania różniczkowego hiperbolicznego opisującego nieustalony przepływ gazu

Effective numerical methods for solving hyperbolic partial differential equations
describing the transient gas flow

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WARSZAWA 2020

Abstract

Effective numerical methods for solving hyperbolic partial differential equations describing the transient gas flow

The aim of the work was to analyze the hydraulic models used to describe the transient gas flow.

Such models are created based on the momentum, energy and continuity equations. We also need an equation of state that expresses the pressure in terms of density and temperature. Consequently, a set of partial differential equations is obtained.

First-order hyperbolic partial differential equations and second-order hyperbolic partial differential equations are presented.

Numerical methods are the basis for solving this type of equations. It is an essential tool for the correct modelling of gas flow in the network, which has an impact on the proper operation of the existing system and future expansion as well.

Differential methods, method of characteristics or a combination of simple methods with numerical constant-step integration are commonly used.

The paper presents a general scheme for solving partial differential equations with the use of the method of characteristics and several implicit methods.

Keywords: partial differential equations, hydraulic models, explicit methods, implicit methods