# FUZZY SUPPORT MODEL FOR LONG PIPELINES BY USING DB2 APPROACH

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**Abstract:**
Transient in long pneumatic lines is analyzed from time delay and construction view of point. After presented mathematical model of pneumatic system, there are shown stability issues, and it is calculated length of the pneumatic pipeline for which the system is stable. The paper's main contribution is the application of decision and fuzzy logic in determination the stability of long pipeline from construction perspective by using DB2 database approach, and proposal of possible applications of knowledge database and fuzzy logic in making diagnostics conclusions about the states of the safe operation and reliability of the system.

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## 1. INTRODUCTION

There has been ongoing theoretical and empirical research in solving problem of transients in long pneumatic lines. Many theories have been developed on the subject concerned with sound transmission, and distortion of sound waves in lines, and as well have come number of mathematical models and analytical procedures for predicting the dynamic characteristics of long transmission lines [1]. The first of these assumed harmonic time dependence at the outset, and output frequency response for the small signals [2-3]. Another line of research has derived general transfer functions to be used in transient as well as frequency-response analyses.

Considering real pneumatic systems, it is crucial to describe them with time delay, nonlinearities, with attempt of not creating only academic model, by the reference [3]. Despite of these problems, development of fast algorithms and using the numerical methods for solving partial different equations, as well as enhanced simulation and animation techniques become the necessity [4].

Pneumatic cylinder systems significantly depend of behaviour of pneumatic pipes [4], thus it is very important to analyze the characteristics of the pipes connected to a cylinder. Mathematical model of this system is described by partial different equations [5], and it is well known fact that it is distributed parameter system. These systems appear in various areas of engineering, and one of the special types is distributed with distributed control [6]. The crucial two problems emphasize a finite time for a pressure signal to traverse the length of the line, and the occurring of standing waves caused that a pressure pulse at one end of the line does not result the pressure at the other end to begin to rise instantly.

The second phenomena is focused on the moment when frequency passes the natural frequency. Signal transient in long pneumatic lines is analyzed from time delay and parameter distribution view of point. The pressure or flow changing phenomena in pneumatic control systems is very complex, and has a significant effect on the stability, response and construction issues of the system and its components.

Up to now, the published papers have not been shown complete analyze of this phenomena and as well have not presented the adequate control system as shown in the reference [5]. The chosen system should be stable in required period of time, and this important task is obtained by using practical stability theory for distributed parameter systems

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