1. Introduction

Traffic congestion has become an increasingly severe problem in many major cities around the world (Greyti *et al*., 2018), including in the city of Bandung (Dewi *et al*., 2020)(Bima, 2023). Population growth and increased vehicle use have exacerbated congestion in the city in recent years. Bandung has a vehicle-to-population ratio of almost 1:1, with about 1.7 million two-wheelers, 500 thousand four-wheelers, and a population of about 2.5 million people (Syahrial, 2023), thus causing high density on the city's streets. One of the areas that often experience congestion is Jalan Buah Batu, one of the main roads in the city of Bandung that connects several important roads such as Jalan Siswa Pejuang 45, Jalan BKR, Jalan Soekarno Hatta, and Jalan Terusan Buah Batu (Susanto *et al*., 2016).

Jalan Buah Batu, with its characteristics of being a secondary collector's road with a width of about 13 meters and a length of about 1.70 kilometers (Susanto *et al.*, 2016), is a vital artery that is very important for mobility in the city of Bandung. Its strategic location, close to toll roads, entertainment centers, office areas, and educational institutions (Susanto *et al.*, 2016), makes it the main choice for people to reach various important locations (Ayuni & Fitrianah, 2019). However, with its various strategic functions, Jalan Buah Batu also faces significant challenges in maintaining smooth traffic and avoiding congestion that can harm mobility and the city's economy. The congestion that often occurs on this road not only interferes with the daily activities of residents but also has a negative impact on economic efficiency and quality of life (Yermadona & Meilisa, 2020).

Traffic flow models have been developed by many researchers to understand and address congestion problems. Traffic problems, such as congestion can be explained by traffic flow models. There are two main models in traffic flow: microscopic models that describe the individual behavior of cars such as position, speed, and acceleration, and macroscopic models that use partial differential equations to discuss traffic variables such as flow, speed, and density, also known as the Lighthill-Whitham-Richards (LWR) model (Góra *et al*., 2020). Microscopic models tend to be more detailed and can capture the individual behavior of vehicles, while macroscopic models focus more on the overall behavior of traffic flows.

This study will explain the simulation of traffic flow using the LWR model. In the LWR model, the traffic flow is governed by the conservation equation, which can be rewritten as the transportation equation. The velocity variable in the transport equation is represented by the velocity function, which must be defined based on the observation of velocity. This LWR model is very useful in predicting traffic flow patterns and identifying potential congestion points based on changes in vehicle density.

The purpose of this study is to analyze and simulate the traffic flow model using the velocity-density function obtained from the observation data. The structure of this journal is as follows: The *Introduction* section introduces the topic. The *Methods section* discusses the macroscopic model of traffic flow along with linear regression. Finally, the *Result and Discussion* section presents the conclusions obtained from this study.