

1 Original research paper

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3 **The experiment platform of micro scenario for**
4 **traffic flow detector of buried type testing**

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12 **Abstract**

13 The detection performance of all kinds traffic flow detectors of buried type has certain
14 differences. This research builds the entity platform of urban road traffic micro area scene,
15 buries traffic flow detectors, and leds vehicles running through the detectors cycle continuously.

16 The oscilloscope connectes to the detectors and gets the real-time detection of waveform of all
17 kinds of detectorthe, and later to carry out its detection performance comparison analysis.

18 **Keywords:**

19 Entity platform of micro scenario; Traffic flow detector of buried type; Dynamic testing;

20 Waveform detection

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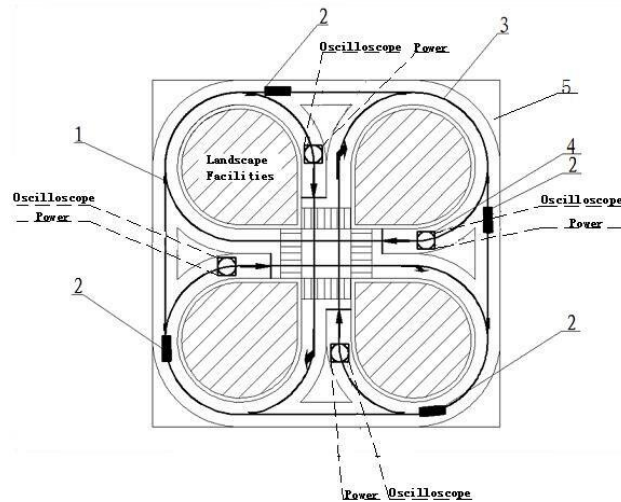
21 **1 Introduction**

22 At present, equipment of traffic flow detection has widely applied in the traffic flow detection.
23 But the kinds of equipment can only get easy results of teaching experiment or appear the
24 result in demonstration and simulation. Students can't understand the working principle, layout
25 methods, installation operation and data collection and processing of the equipment visually
26 (He et al., 2006). The experimental platform of high level integration integrated is expensive.
27 Its installation is complex and the maintenance is complex and so on (Yang et al., 2015).
28 Through a lot of practice analysis and the application of related testing equipment, the theory
29 applying and practice was set in one body. The traffic flow detection experiment device was
30 designed and build.

31 The traffic flow detection experiment is composed of vertical miniature real road traffic
32 system, road path, plane crossroads, transport facilities, traffic guide groove modified remote
33 control vehicles, traffic flow detection, equipment bay, oscilloscope and so on. Remote control
34 vehicles drive along the route. The oscilloscope shows waveform of the traffic flow detector
35 connected with the vehicles to meet the demand in the work by field test information and data
36 and analysis application.

37 **2 Platform structure**

38 The main platform structure is shown in Fig. 1. 1 is wedge block. 2 is modified remote control
39 vehicles. 3 is guide-track groove. 4 is equipment bay, and 5 is platform body.



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Fig. 1 Platform structure

42 The guide-track groove (3) is at the top of the platform (5). The remote-control vehicles (2) is
 43 at the top of the Guide-track groove (3). The equipment bay (4) is underneath the Guide-track
 44 groove (3). There are interconnected wire slots between the equipment bay (4). The
 45 Oscilloscope is placed on the bracket on the platform (5) and the lower end of the oscilloscope
 46 is equipped with power supply. The wedge block (1) is installed on the outer edge of
 47 guide-track groove (3).

48 The experiment device of traffic flow detection is a basic experiment teaching platform to
 49 carry out the practice used in traffic engineering or related major. Coil detector and
 50 geomagnetic detector are installed in platform. When vehicles go through the detector,
 51 waveforms from Oscilloscope are compared and judged and it can get information of traffic
 52 flow and vehicle information including big or small vehicle information. Meanwhile, when
 53 multiple vehicles queuing drove past, it can get vehicle density, queuing length, time headway,
 54 lane occupancy and information including.

55 There are guide slots to guide the vehicle on the platform which provide travel path for

56 vehicle. There is equipment bay of detachable under the platform. it is guide-track groove
57 between equipment bay and the equipment bay. The platform is divided into four regions by
58 guide-track groove. Test-in-Process, vehicles choose a different path as needed. Vehicle 2 of
59 used is modified. Appropriate part at the bottom of the car body is equipped with guide
60 mechanism, but it does not change vehicle characteristics. Steering mechanism is used with
61 guide-track groove 3 which can change the original remote control guide to rail move. There
62 has a round hole in the platform. It is convenience to install detector of stents such as infrared
63 detector, microwave detector, and traffic video monitoring detector etc. removable equipment
64 bay 4 is installed under the platform of pavement to provide sufficient space to place the
65 various types of buried detector. In addition, there is opened wire slot around the equipment
66 bay and on the roads convenience to connect the equipment to complete testing capabilities.

67 Modified vehicle along a guide rail groove can choose various kinds of path. In the guide
68 groove junction, wedge block is put in the guide groove to change driving directions. The
69 equipment bay has plenty of space in the middle of the lane to place different kinds of buried
70 detector. After placing equipment, space is leaved between vehicle chassis and detectors,
71 which can be filled in different medium. It is convenience to simulate a car travels in the
72 pavement work he status of each detector.

73 There are four equipment bays which have the same specifications and be connected with
74 platform roads. Every equipment bay is in the guide slot directly to ensure the car drive through
75 road from the central. Leaving regulations space between detector and the road, the space
76 can be filled in different medium to simulate the real pavement structure for evaluation and
77 analysis of the various media for influence of detector.

78 **3 The main function of the platform**

79 1) The platform can realize the vehicle travel in multipath and many medium. It plans a
80 variety of driving path between various regions and meet the multipath circulation driving mode.
81 Equipment bay is located the middle of the road, which is put the detector and leaved a space
82 between vehicle chassis and detector. The space can be filled in different medium, that is
83 convenience to simulate the work status of each detector of different road situation.

84 2) Function of detection and data acquisition. It can distinguish the size of the vehicle
85 through the waveform detected by oscilloscope. The information collected is a straight line
86 when there is no vehicle. The detected waveform and waveform parameters are different when
87 the models and the speed changes.

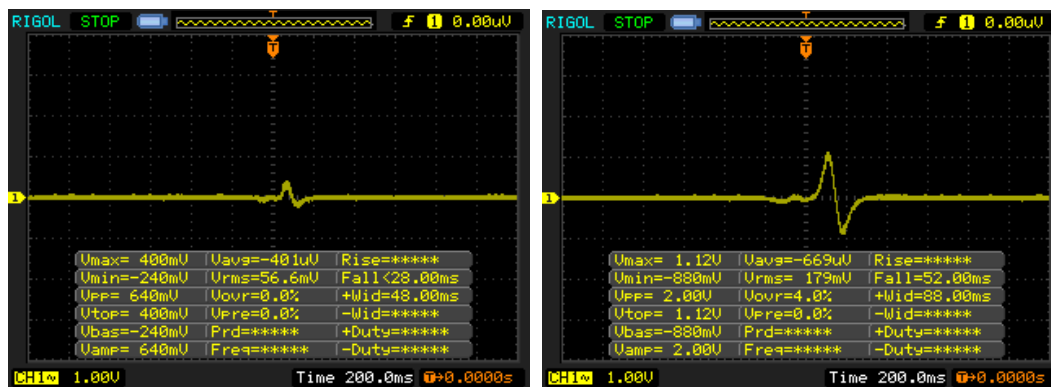
88 3) Function of application and analysis. Due to a lot of influence factors of geomagnetic field,
89 in the same conditions, the experiment measures multiple sets of data to improve the accuracy
90 of the test experiments. Considering the different speed of different sizes of vehicles in the
91 road traffic system, the waveform and amplitude of the X axis and Y axis were collected when
92 M1 and M2 in different speed conditions. Through the statistical analysis of the measured data,
93 it analysis the traffic parameters under the condition of different media.

94 4) The experimental process can reflect the working principle, layout methods, installation
95 operation, data acquisition and processing of magnetic and coil detector, which is easy to
96 make students understand the difficult sections of teaching theory.

97 **4 Platform test and data analysis**

98 *4.1 Vehicle type change test*

99 To distinguish the vehicle types, we refit the different sizes of remote control car and analyzed.
 100 Through the oscilloscope collection collection vehicles, various sizes through the waveform detector,
 101 when there is no vehicle through, the information collected is a straight line. The waveform and
 102 waveform parameters of vehicle through the detector are shown in Fig. 2. Due to the vehicle
 103 structure similar, it can be seen from the diagram that waveform is similar between small cars
 104 and large cars, but there is a big difference in the waveform parameters. The waveform
 105 amplitude of large cars M2 is greater than small M1. It Can easily distinguish M1 and M2
 106 through the waveform amplitude.



(a) Small cars M1

(b) Big cars M2

Fig.2 Waveform of vehicles through the detector

110 *4.2 The speed change test*

111 Considering the speed of vehicle through the influence of the waveform, in this paper, the
 112 different vehicles under the condition of different velocity through the detector of the wave is
 113 studied. Test experiment by changing the speed of the vehicle, to eliminate the effects of other
 114 factors on the vehicle load special soil package to change the weight of the vehicle. Through
 115 the measurement of the scale, it increases the weight of 50g each time. Through test and
 116 analysis, vehicle speed and vehicle weight is about a linear relationship, the heavier the weight,

128 The traffic flow detection experiment device can realize dynamic detection. The experiment
129 data is in the process of vehicle movement. At the same time, through the position of the guide
130 rail groove and lane width, turning radius, the design of the driving track, it can meet the traffic
131 scene and track composite driving way. It can meet more road surface condition detection,
132 through different media fill, simulation of the detector in the real road buried from, the influence
133 degree of the evaluation analysis of each media in the detector. It can realize the multiple
134 attribute test, through to the vehicle different attributes (vehicle in the different sizes, different
135 speeds, different axle, etc.) under the condition of the change of the data to test, the rationality
136 of the analysis of the experiment process and the influence factors of the experimental results.
137 But devise testing accuracy are greatly influenced by outside interference, how to reduce the
138 interference caused by the error will be the focus of the next step research.

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