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Development of Pothole Management Method Using Automated Equipment with Multi-Beam Sensor

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Abstract : The climate change and increase in heavy traffic have been accelerating damages that cause the problems such as pothole on asphalt pavement. Pothole causes traffic accidents, vehicle damages, road casualties and traffic congestion. A quick and efficient maintenance method is needed because pothole is caused by stripping and accelerates pavement distress. In this study, we propose a rapid and systematic pothole management by developing a pothole automated repairing equipment including a volume measurement system of pothole. Three kinds of cold mix asphalt mixture were investigated to select repair materials. The materials were evaluated for satisfaction with quality standard and applicability to automated equipment. The volume measurement system of potholes was composed of multi-sensor that are combined with laser sensor and ultrasonic sensor and installed in front and side of the automated repair equipment. An algorithm was proposed to calculate the amount of repair material according to the measured pothole volume, and the system for releasing the correct amount of material was developed. Field test results showed that the loss of repair material amount could be reduced from approximately 20% to 6% per one point of pothole. Pothole rapid automated repair equipment will contribute to improvement on quality and efficient and economical maintenance by not only reducing materials and resources but also calculating appropriate materials. Through field application, it is possible to improve the accuracy of pothole volume measurement, to correct the calculation of material amount, and to manage the pothole data of roads, thereby enabling more efficient pavement maintenance management. Acknowledgment: The author would like to thank the MOLIT(Ministry of Land, Infrastructure, and Transport). This work was carried out through the project funded by the MOLIT. The project name is 'development of 20mm grade for road surface detecting roadway condition and rapid detection automation system for removal of pothole'.
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