Contribution ID: **462** Type: **Oral Presentation**

Void deformation and connecting visualization in asphalt mixture under dynamic water pressure

Tuesday, 14 May 2024 12:15 (15 minutes)

Water transport under dynamic vehicle load is the primary causation of asphalt pavement water damage. The dynamic water breaks through the inner voids and destroys the micro-structure of asphalt mixture, and consequently degrades asphalt pavement durability. Understanding the microstructure evolution and void connecting during dynamic water load contributes to the water damage mechanism of asphalt pavement.
This study developed a water seepage device for asphalt mixture and used pulse water pressure to simulate the dynamic water load caused by tire crimping. The pulse sinusoidal water pressure with a frequency of 10Hz and a range from 0 to 0.7 MPa was served. X-ray CT scanning was performed on the dry asphalt mixture and also in-situ seepage asphalt mixture after 3, 8, 15, and 20h water load. A 3D digital void model was developed to analyze the void structure evolution. The translation, volume changing, and connecting in void structure were recognized and analyzed. The 3D water-activated void and water passageway were reconstructed.
The result explained the variation of dynamic flow rate curves by analyzing the microstructure evolution during dynamic water pressure load. The deformation characteristics of voids were addressed and its contribution to water extension was analyzed. The 3D visible water passageway and saturation showed the dynamic water transport process and gave direct evidence of the macro seepage behavior variation.
This study proposes a method to quantify the void deformation in asphalt mixture and explains the macro seepage behavior from the micro aspect. It contributes to understanding the water transport in asphalt pavement and improving its durability.

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

I would like to submit this presentation into the MDPI student poster award.

Country

China

Porous Media & Biology Focused Abstracts

References

Conference Proceedings

I am not interested in having my paper published in the proceedings

Primary authors: SHI, Hao; RUECKER, Maja (Imperial College London); Prof. XU, Huining

Presenter: SHI, Hao

Session Classification: MS10

Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies