JUN SEON LEE, Dept. of Civil and Environmental Engineering, West Virginia University, Morgantown, WV, 26506, and SEUNG HO HONG, Dept. of Civil and Environmental Engineering, West Virginia University, Morgantown, WV, 26506. Application of various shear stress calculation methods with respect to different bridge abutment lengths.

When a bridge abutment occupies a significant part of the channel width, the water surface elevation in the upstream of the bridge rises in comparison to that which would occur without the bridge, and this phenomenon is called backwater effect. Due to the backwater in the bridge approach section, several of bed shear stress estimation methods shows an inaccurate result because approach uniform flow might not be assumed depending on the degree of backwater amount. Thus, in this laboratory study, seven widely used shear stress formulas are applied in the bridge approach section subjected to the backwater according to the abutment length, and the results are compared for their validation. For the detailed velocity and turbulence measurements, 3D downlooking Acoustic Doppler Velocimeter (ADV) was used and three different lengths of bridge abutment were constructed in the laboratory to simulate various degree of backwater effect for shear stress calculation in the approach section. The experimental comparison shows that the methods using Reynolds stress and Turbulence Kinetic Energy concept were the most suitable of calculating shear stress in the approach section under severe backwater condition. For other methods leading to inaccurate estimations, the calibrating coefficient is suggested.