Boundary shear-stress distributions for transverse features in a sinuous channel

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Abstract: Transverse features are rock structures, usually installed in series around a river bend, which can control near-bank flow velocities, increase bank stability, decrease the effect of secondary currents and promote habitat. A 1:12 Froude-scale physical hydraulic model was used to evaluate transverse features for use in a 29-mile reach of the Rio Grande River in central New Mexico. Initially, a sinuous trapezoidal channel with two consecutive bends was evaluated as an approximation for natural channels. A total of 77 transverse feature designs were tested in the trapezoidal channel in addition to evaluating channel hydraulics without any transverse features, referred to as baseline conditions. Subsequently, a native-topography channel was constructed and evaluated where the topography was based on surveys from two bends of the Middle Rio Grande. A total of 4 transverse feature designs in addition to baseline conditions were evaluated with the native-topography model. A comparison between baseline boundary shear-stress distributions for the trapezoidal and native-topography channels was made. Further, comparisons were made between baseline shear-stress distributions and shear-stress distributions observed with installed transverse-features for both the trapezoidal and native-topography channels. Similar shear-stress trends were observed for the trapezoidal and native-topography channels; however, increased spatial variability was consistently observed for the native-topography channel compared to the trapezoidal channel.