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Flow dynamics at a river confluence on Mississippi River: field measurement and large eddy simulation[1] TRUNG LE, ALI KHOSRONEJAD, Saint Anthony Falls Laboratory, University of Minnesota, NICOLE BARTELT, SOLOMON WOLDEAMLAK, BONNIE PETERSON, PETRONELLA DEWALL, Minnesota Department of Transportation, FOTIS SOTIROPOULOS, Saint Anthony Falls Laboratory, University of Minnesota, SAINT ANTHONY FALLS LABORATORY, UNIVERSITY OF MINNESOTA TEAM, MINNESOTA DEPARTMENT OF TRANSPORTATION TEAM — We study the dynamics of a river confluence on Mississippi River branch in the city of Minneapolis, Minnesota, United States. Field measurements by Acoustic Doppler Current Profiler using on-board GPS tracking were carried out for five campaigns in the summer of 2014 and 2015 to collect both river bed elevation data and flow fields. Large Eddy Simulation is carried out to simulate the flow field with the total of 100 million grid points for the domain length of 3.2 km. The simulation results agree well with field measurements at measured cross-sections. The results show the existence of wake mode on the mixing interface of two branches near the upstream junction corner. The mutual interaction between the shear layers emanating from the river banks leading to the formation of large scale energetic structures that leads to "switching" side of the flow coherent structures. Our result here is a feasibility study for the use of eddy-resolving simulations in predicting complex flow dynamics in medium-size natural rivers.

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