

**CESARE'17**

*International Conference Coordinating Engineering for Sustainability and Resilience  
Dead Sea, 3-8 May 2017*

## **Resilience Study of AASHTO Drag Force Coefficients using Finite Element Method**

**Amin H. Almasri<sup>1</sup> and Shadi Moqbel<sup>2</sup>**

<sup>1</sup>Associate Professor, Civil Engineering Department, Jordan University of Science and Technology, Irbid, 22110, Jordan. E-mail: [ahalmasri@just.edu.jo](mailto:ahalmasri@just.edu.jo).

<sup>1</sup>Associate Professor, Civil Engineering Department, Fahad Bin Sultan University, Tabuk, Saudi Arabia. E-mail: [aalmasri@fbsu.edu.sa](mailto:aalmasri@fbsu.edu.sa)

<sup>2</sup>Assistant professor, Civil Engineering Department, The University of Jordan, Amman, Jordan.  
E-mail: [s.moqbel@ju.edu.jo](mailto:s.moqbel@ju.edu.jo)

**Keywords:** Drag coefficient, Finite element method, AASHTO

### **ABSTRACT**

Drag force is usually exerted on bridge piers due to running river water. This force is calculated empirically based on drag coefficients stated in design codes and specifications. Different values of drag coefficients have been reported in literature. For example, AASHTO LRFD Bridge Design Specifications uses a drag coefficient of 1.4 and 0.7 for square-ended and semicircular-nosed pier, respectively, while Coastal Construction Manual (FEMA P-55) recommends a value of 2 and 1.2 for square and round piles, respectively. In addition, many researchers have obtained other different values of drag coefficient under similar conditions (i.e. similar range of Reynolds number) reaching to 2.6 for square object. The present study investigates the drag coefficient of flow around square, semicircular-nosed, and 90o wedged-nosed and circular piers numerically using finite element method. Results showed that AASHTO values for drag force coefficient varied between very conservative to be under-reckoning. The study recommends that AASHTO drag coefficient values should be revised for different circumstances and under more severe conditions.

*CESARE'17 – An International Conference  
coorganised by the Schools of Engineering  
of Jordan University of Science and Technology (JUST), the Aristotle University of  
Thessaloniki (AUTH) and the University of Birmingham (UoB)*

