DONALD D. GRAY, Department of Civil and Environmental Engineering, West Virginia University, Morgantown, WV, 26506. **Three dimensional visualization of the specific force function of open channel hydraulics.**

Specific force was introduced to the science of hydraulics in 1860 by Bresse in his analysis of the hydraulic jump. Since that time, this function has also been shown to be a valuable tool for understanding and calculating the forces on transitions and obstacles in open channels. Specific force is the sum of the momentum flowrate and the hydrostatic thrust on a cross sectional area normal to a parallel flow, divided by the specific weight of the flowing liquid. It has the dimensions of length cubed and is also known by other names including specific momentum and specific thrust. Although it is discussed in all leading textbooks on open channel flow, little attention has been paid to its shape. The specific force for any given cross sectional geometry defines a surface in a three dimensional space spanned by depth, flowrate, and specific force. Most books contain only two dimensional plots of depth vs. specific force with flowrate as a parameter, usually for rectangular or undefined cross sections. Plots of depth vs. flowrate with specific force as a parameter are found only in Akan (2006). No one has shown plots of flowrate vs. specific force with depth as a parameter. Using the symbolic mathematical computation program Mathematica, the specific force surface will be shown for the first time in three dimensions together with its two dimensional projections for rectangular, triangular, trapezoidal, parabolic, and circular cross sections. These visualizations enable a fuller appreciation of how this important function depends on its variables.

A. O. Akan, 2006. Open Channel Hydraulics, Elsevier, New York, Section 2.3.