Report on Creek in Hanging Lake, Colorado

The purpose of the image is to visualize the flow of water. In other words, I was trying to gather information on the whole fluid speed and density without the need of using data. With the help of a home colleague, we were also trying to see the behavior of water with regard to materials present on the surface of the body immersed in the flow. The image presents water flow on creek on hanging lake Colorado, with water flowing in a steady manner. The behavior is also path lines and streamlines overlap and the streamlines can be well visualized.

The apparatus used include;

1. Apparatus for monitoring flow rate (model H1D)

2. Hydraulic bench/water with volumetric control

3. Pilot tube used for measuring high flows

4. Stopwatch with a digital display

5. 1 rotameter with a large angle of view tapping on the diffuser manometer DEFG Venturi meter Hflow AC

The formula used was a Steady Flow Energy Equation (also known as Bernoulli's Equation). In mathematical terms, it can be stated in the following way:

$p1 + 122g + z1 = p2g + 2\ 2g + z2 + h12$ (1)

The hydrostatic head is denoted by the symbol pg. The kinetic head is represented by 22g (which is the mean ratio of velocity, i.e. the ratio of volumetric discharge to cross-sectional area of tube) and the potential head is represented by z. The total head is represented by $p/g + 2/2g + z$.

The visualization technique used is the schlieren photography technique. It relies on the fact that light rays are bent whenever they encounter changes in density of a fluid (Jones et al. 2018). It was used to distinguish fluids of varying densities. There were bright color light and a knife edge for focusing the light on ether sides of the flow. The long exposure photography technique was used to the moving water.

Camera: iPhone 11 pro max. The camera location was 12cm to the right of the front right-hand corner of the grid, 50cm towards the front, and 30cm vertically measured from the front right-hand corner of the grid. Light: The light was 75cm to the left of the front left corner of the grid, 15cm towards the front, and 50cm vertically from the front left corner of the grid. Exposer; 2 minutes exposure.

At the lowest discharges, water went through the reach at an average pace of 0.7 mph, taking a little less than 1 day (22 hours) to travel the 15 mi. At the maximum releases, water traveled at 2.3 mph and took roughly 7 hours to travel the same distance. What I liked most about the image is that it can empower and inspire people to address key water issues. Key question to ask is that if the camera image results are the same as mirror image. A key improvement is to make use of a good tripod. When photographing water, a tripod is absolutely necessary because you may need to use longer exposure times.

References

Jones, H. J., Rajora, V., & Menon, S. K. (2018). Investigation of water jet break up by supersonic rocket exhaust. In *2018 International Energy Conversion Engineering Conference* (p. 4697).