## عنوان مقاله:

Measuring Discharge in a Shallow River in an Arid Area solely using an Unmanned Aerial Vehicle

## محل انتشار:

مجله پژوهش های خشکسالی و تغییر اقلیم, دوره 2, شماره 2 (سال: 1403)

تعداد صفحات اصل مقاله: 12

## نویسندگان:

.Farhad Akbarpour – River Conservation Engineer, Tehran Regional Water Company, Tehran, Iran

.Mohammad Adel Khorasani Nejad – PhD candidate, Islamic Azad University, Science and Research Branch, Tehran, Iran

.Shervin Shahriairi – PhD graduate, Institute of Hydraulic Engineering and Water Resources Management, Graz University of Technology, Austria

.Mostafa Rahmanshahi – Pos tdoctoral fellow, Hong Kong Polytechnic University, Hong Kong

## خلاصه مقاله:

Unmanned Aerial Vehicles (UAVs) have recently been applied for river flow measurement. In this paper UAV images were first used to acquire surface velocity fields of a small river in an arid area in Iran based on the principles of Large Scale Particle Image Velocimetry (LSPIV). Subsequently, Large Eddy PIV method was applied on the instantaneous velocity data to obtain turbulent kinetic energy dissipation rates along a selected cross section of the experimented river. In addition, a UAV image was captured and processed to gain the bed material grain size distribution and consequently the Manning roughness coefficient. The resulted gradation curve matched the graph given by sieve analysis with an accuracy of nearly ۷.۸ percent. Moreover, an equation combining the acquired surface velocity, dissipation rates and Manning coefficient was used to estimate the river bathymetry. Although, the evaluated bathymetry does not fit the surveyed cross section very well, the average predicted depth matches the measured mean depth with a high precision. Finally, the river flow rate calculated using the information solely resulted from UAV images fitted the measured discharge with an accuracy of ۵ percent proving the described framework to be a very effective method for primary river flow evaluation especially when supplementary depth measurement is not .feasible

## کلمات کلیدی:

Flow Rate, Large Scale Particle Image Velocimetry, UAVs, Arid areas, Large Eddy PIV