Possible Topics for Hydrology Webinars

Guillermo Tabios III (1/14/2022)

Topics to be Covered per Session (2 hours per session/day)

Hydrologic Data Analysis
- Rainfall and streamflow data measurements
- Data quality assurance, data consistency
- Statistical testing for homogeneity/stationary of hydrologic data
- Sampling error and sampling frequency in time and space

Streamflow Flow/Runoff Estimation
- Rainfall abstractions (interception, surface retention, depression storage, infiltration, evapotranspiration)
- Streamflow generation process and estimation
- Rainfall-streamflow transformation: hydrologic and hydraulic methods
- Hydrologic models and computer model applications

Flow Duration Curves
- Annual and seasonal flow duration curves
- Rainfall depth-area duration curves and spatial interpolation
- Drought analysis based on runs analysis

Frequency Analysis
- Basic probability and statistics
- Rainfall intensity-duration frequency analysis
- Low flow and high flow frequency analysis
- Regional flood frequency analysis
- Nonstationary Extreme Value Analysis under Changing Climate

Optimization of Hydro-Thermal Energy Mix (?)
- Optimization techniques
- Hydro-Thermal power generation and other sources (i.e., solar, wind, etc)
- Optimization of large-scale systems and energy mix

Dams/Weirs and Reservoirs for Hydropower Generation
- Dams and weir structures and reservoir operations
- Hydropower plants (hydraulic machineries and components)
- Applicability and selection of hydro-machinery (electro-mechanical equipment) for types of dams/weirs and reservoir operations

Sustainability of Hydropower Projects
- Monitoring and enforcement of dam safety and safe operations of dams
- Sustainable planning, design and operations of reservoirs by life cycle analysis
- Sediment management for extending the life of reservoirs

Other Possible Topics

Spatial Interpolation of Hydrologic Variables
- Spatial interpolation problem
- Spatial interpolation techniques for point estimation and areal averaging
- inverse distance method, multiquadric interpolation, optimal interpolation and Kriging.

Stochastic Modeling of Streamflow
- Continuous and intermittent streamflows
- Continuous and discrete ARMA models; other time series models
- Model building: identification, parameter estimation and diagnostic checks
- Applications: streamflow data generation and forecasting

Fundamentals of Sediment Transport in Rivers and Reservoirs
- River morphodynamics
- Sediment transport: incipient motion; scour and deposition process
- Watershed sediment yield estimation and soil erosion control
- Reservoir sedimentation and sediment management