



Exponent[®]
Engineering & Scientific Consulting

Chiyu Lin, P.E.

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Professional Profile

Mr. Lin's background is in civil and environmental engineering focusing on surface hydrology and water resources. He is a licensed engineer with 8 years of experience specializing in hydrology, data analysis, and hydraulic and hydrodynamic modeling.

Mr. Lin uses various models to support a variety of projects including water balance calculations, peak-flow hydrograph simulations, surface water and groundwater interactions, source fingerprinting on water quantity and quality, snow water and snow depth estimation, and sediment transport investigations. He has used a range of hydraulic and hydrologic models such as HSPF, DSM2, SWMM, and HEC-RAS; land surface models that study interaction between surface water and groundwater such as IWFEM and VIC; and hydrodynamic models such as DELFT 3D.

Mr. Lin is also an experienced database manager and data analyst. He has experience processing and analyzing meteorological, geological, and USGS measurement data for various hydrologic modeling efforts. He provides technical support involving statistical analysis, database querying and updates, and data visualizations for a wide variety of data, including field measurements, laboratory analyses, and publicly available datasets. He is fluent with programming languages and database management tools such as R, PERL, MS SQL Server, MySQL, and PostgreSQL.

Academic Credentials & Professional Honors

M.S., Civil and Environmental Engineering, Carnegie Mellon University, 2009

B.S., Civil Engineering, National Taiwan University, 2004

Licenses and Certifications

Professional Engineer Civil, Washington, #56283

Professional Certificate in Data Science

Professional Certificate in Database Management

Professional Affiliations

American Society of Civil Engineers

Publications

Chen F, Barlage M, Tewari M, Rasmussen R, Jin J, Lettenmaier DP, Livneh B, Lin C, Miguez-Macho G, Niu G, Wen L, Yang Z, 2014. Modeling seasonal snowpack evolution in the complex terrain and forested Colorado Headwaters region: A model intercomparison study, *J. Geophys. Res. Atmos.*, 119, 13,795-13,819, doi: 10.1002/2014JD022167.

Nijssen B, Shukla S, Lin C, Gao H, Zhou T, Sheffield J, Wood EF, Lettenmaier DP. A prototype Global Drought Information System based on multiple land surface models. *Journal of Hydrometeorology* 2013; 15:1661-1676. doi: 10.1175/JHM-D-13-090.1.

Livneh B, Rosenberg EA, Lin C, Nijssen B, Mishra V, Andreadis L, Maurer EP, Lettenmaier DP. A long-term hydrologically based data set of land surface fluxes and states for the conterminous United States: Updates and extensions. *Journal of Climate* 2013. doi:10.1175/JCLI-D-12-00508.1.

Presentations

Lin C, Chen F, Lettenmaier DP. Modeling snowpack evolution in complex forested terrain in the Colorado River Headwaters Region: A model intercomparison study. Poster presentation, University of Washington Water Symposium, Seattle, WA, 2013.

Lin C, Li X, Tsang L, Josberger E, Lettenmaier DP. Assimilation of AMSR-E snow products with optimized snow parameters in mountainous basins. Poster presentation, American Geophysical Union Fall Meeting, San Francisco, CA, 2012.

Lin C, Xu X, Livneh B, Lettenmaier DP, Tsang, L, Josberger E. Assimilation of AMSR-E snow products in mountainous basins. Poster presentation, American Geophysical Union Fall Meeting, San Francisco, CA, 2011.

Project Experience

Hydrology / Hydrogeology / Hydraulic Modeling

Delta Simulation Model II (DSM2)

Used the DSM2 model, which is maintained by the California Department of Water Resources, to evaluate current and proposed model scenarios for the California WaterFix project for various clients in the Sacramento/San Joaquin Delta. Conducted DSM2 runs to simulate surface hydrology and water quality within the Sacramento-San Joaquin Bay-Delta (Delta), estimate water balance and volumetric fluxes, calculate source fingerprints, and compute salinity.

Modified a DSM2 model for a water rights matter involving an irrigation district in the Delta. Provided volumetric fingerprinting analysis to describe the composition and source of water used by the irrigation district and performed residence time calculations for current and historical scenarios to support a study of water availability during drought conditions.

Storm Water Management Model (SWMM)

Evaluated and maintained an existing SWMM project for a confidential aerospace facility in Southern California. Conducted model runs, analyzed SWMM output, and used model results to design and refine a program to collect flow-weighted composite storm water samples as required by the facility's National Pollutant Discharge Elimination System (NPDES) permit for storm water.

Built a SWMM model to evaluate potential changes to the water balance and flow rates for a proposed agricultural operation in Hawaii. Constructed model scenarios to evaluate existing and proposed project conditions. Used model output to evaluate the impacts of the proposed project on infiltration, evaporation, runoff and peak flow rates.

Hydrologic Engineering Center River Analysis System (HEC-RAS)

Utilized the HEC-RAS model to support a sediment transport investigation in a narrow, shallow lake in New Jersey. Simulated runoff hydrographs associated with a range of measured and design storms under both historical and current lake bathymetry conditions.

Conducted HEC-RAS modeling to support permitting for a proposed application of aquatic pesticides in Southern California. Built and calibrated the model to simulate flow hydrographs and water quality within a channel and long, narrow reservoir system. Developed R programs to post-process HEC-RAS results to simulate pesticide loss and decay in the system.

Delft3D

Conducted modeling using Delft 3D, a 3D hydrodynamic and sediment transport model, within a semi-enclosed embayment to evaluate circulation and mixing and the fate and transport of storm flows and sediment particles from a municipal storm water outfall. Constructed the model with multiple dimensions using domain decomposition driven by tidal-induced currents to track discharge from the storm water outfall and evaluate hydrodynamic conditions that would influence sediment deposition and resuspension.

Variable Infiltration Capacity (VIC) model

Applied the VIC model, a large-scale, semi-distributed land surface and hydrology research model, to simulate snow cover, snow water equivalent (SWE), snow depth, and snowmelt in mountainous areas in the Pacific Northwest and Colorado River headwater regions. Modeling was conducted as part of a model inter-comparison study to evaluate the ability of six major land surface models to simulate snow processes in complex terrains.

Water Resources Engineering

Conducted surface hydrology models to support various engineering projects.

Conducted mathematical simulations of chloride flow through fractures, estimated the breakthrough curve (BTC) of a leakage event, and determined the approximate start time of leakage from an uphill pit in Pennsylvania.

Incorporated meteorological data, stream flow data, soil/infiltration data to provide water balance calculations and estimate annual flow volumes.

Environmental/Ecological Data Analysis

Provided data analysis for an annual monitoring report for a mining company. Reviewed current monitoring data and compiled with historical data. Developed a suite of R programs to automatically process the monitoring data, conduct statistical analyses, and visualize the data.

Provided data format manipulation support to convert data from various tabular formats into standard xml format for data submission to a government agency.

Developed R programs for various data preparation, data manipulation, data processing, and data visualization tasks. Improved data process efficiency and accuracy through automation.

Database Management and Support

Provided continuous monitoring and issued regular updates to a PostgreSQL database that houses analytical data and documents for various projects conducted by a mining company. Conducted database queries to support the clients' requests.

Managed project databases hosted in various platforms including Excel, Access, SQL Server, and PostgreSQL. Provided regular support in querying and updating databases for various projects.

Managed in-house Validation, Analysis, and Storage Tool (VAST) database and exported summary reports to support chemical data analysis tasks for various former manufactured gas plants (MGP) projects.

Compiled data from various projects and built preliminary environmental forensic data library for internal use.

Managed updates to the Toxic Release sector of the Economic Input-Output Life Cycle Assessment (EIO-LCA) model, and implemented data from the U.S. EPA Toxic Release Inventory, Bureau of Economic Analysis of Department of Census, and North American Industry Classification System into the EIO-LCA model.

Managed updates to the Toxic Release sector of the Economic Input-Output Life Cycle Assessment (EIO-LCA). Utilized North American Industry Classification System (NAICS) as an intermediate to convert and allocate Toxic Release Inventory (TRI) data to EIO-LCA model, which is based on Input-Output Commodity Codes (IOCC).