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WORK EXPERIENCE

University engineering lecturer

Technical University of Civil Engineering Bucharest [01/10/2001 – Current]

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Name of unit or department: Hydrotechnical Engineering - **Business or sector:** Education

Research in Hydrologic and Water Resource Modeling, Hydraulic Structures, Earthquake Engineering and Natural hazards in coastal regions.

Teaching classes in Faculty of Hydrotechnics, Technical University of Civil Engineering of Bucharest.

EDUCATION AND TRAINING

Doctor of Engineering

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Advanced studies in Hydroinformatics

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LANGUAGE SKILLS

Mother tongue(s): **Romanian**

Other language(s):

English

LISTENING C1 READING C1 WRITING C1

SPOKEN PRODUCTION B2 SPOKEN INTERACTION B2

DIGITAL SKILLS

Mathcad / MATLAB / HEC-RAS / HEC-HMS / AutoCAD / QGIS / Microsoft Office / C++ / SAP2000 / GeoStudio / HEC-HMS (SMA Deficit and Constant Green-Ampt SCS) / Eureka / Smath studio

PUBLICATIONS

Flood Frequency Analysis Using the Gamma Family Probability Distributions

[2023]

Authors: Cornel Ilinca, Cristian-Gabriel Anghel

This article presents six probability distributions from the gamma family with three parameters for the flood frequency analysis in hydrology. The choice of the gamma family of statistical distributions was driven by its frequent use in hydrology. In the Faculty of Hydrotechnics, the improvement of the estimation of maximum flows, including the methodological bases for the realization of a regionalization study with the linear moments method with the corrected parameters, was researched and is an element of novelty. The linear moments method performs better than the method of ordinary moments because it avoids the choice of skewness depending on the origin of the flows, and is the method practiced in Romania. The L-moments method conforms to the current trend for estimating the parameters of statistical distributions. Observed data from hydrometric stations are of relatively short length, so the statistical parameters that characterize them are of a sample that requires correction. The correction of the statistical parameters is proposed using the method of least squares based on the inverse functions of the statistical distributions expressed with the frequency factor for L-moments. All the necessary elements for their use are presented, such as quantile functions, the exact and approximate relations for estimating parameters, and frequency factors. A flood frequency analysis case study was carried out for the Ialomita river to verify the proposed methodology. The performance of this distributions is evaluated using Kling-Gupta and Nash-Sutcliffe coefficients.

Evaluation of Various Generalized Pareto Probability Distributions for Flood Frequency Analysis

[2023]

Authors: Cristian-Gabriel Anghel, Cornel Ilinca

This article analyzes six probability distributions from the Generalized Pareto family, with three, four and five parameters, with the main purpose of identifying other distributions from this family with applicability in flood frequency analysis compared to the distribution already used in the literature from this family such as Generalized Pareto Type II and Wakeby. This analysis is part of a larger and more complex research carried out in the Faculty of Hydrotechnics regarding the elaboration of a norm for flood frequency analysis using the linear moments method. In Romania, the standard method of parameter estimation is the method of ordinary moments, thus the transition from this method to the method of linear moments is desired. All the necessary elements for the distribution use are presented, such as the probability density functions, the complementary cumulative distribution functions, the quantile functions, and the exact and approximate relations for estimating parameters, for both methods of parameter estimation. All these elements are necessary for a proper transition between the two methods, especially since the use of the method of ordinary moments is done by choosing the skewness of the observed data depending on the origin of the maximum flows. A flood frequency analysis case study, using annual maximum and annual exceedance series, was carried out for the Prigor River to numerically present the analyzed distributions. The performance of this distribution is evaluated using a linear moments diagram.

Frequency Analysis of Extreme Events Using the Univariate Beta Family Probability Distributions

[2023]

Authors: Cornel Ilinca, Cristian-Gabriel Anghel

This manuscript presents three families of distributions, namely the Beta, Beta Prime and Beta Exponential families of distributions. From all the distributions of these families, 14 statistical distributions of three, four and five parameters are presented that have applicability in the analysis of extreme phenomena in hydrology. These families of distributions were analyzed regarding the improvement of the existing legislation for the determination of extreme events, specifically the elaboration of a norm regarding frequency analysis in hydrology. To estimate the parameters of the analyzed distributions, the method of ordinary moments and the method of linear moments were used; the latter conforms to the current trend for estimating the parameters of statistical distributions. The main purpose of the manuscript was to identify other distributions from these three

families with applicability in flood frequency analysis compared to the distributions already used in the literature from these families, such as the Log-logistic distribution, the Dagum distribution and the Kumaraswamy distribution. The manuscript does not exclude the applicability of other distributions from other families in the frequency analysis of extreme values, especially since these families were also analyzed within the research carried out in the Faculty of Hydrotechnics and presented in other materials. All the necessary elements for their use are presented, including the probability density functions, the complementary cumulative distribution functions, the quantile functions and the exact and approximate relations for estimating parameters. A flood frequency analysis case study was carried out for the Prigor River, to numerically present the proposed distributions. The performance of these distributions were evaluated using the relative mean error, the relative absolute error and the L-skewness–L-kurtosis diagram. The best fit distributions are the Kumaraswamy, the Generalized Beta Exponential and the Generalized Beta distributions, which presented a stability related to both the length of the data and the presence of outliers.

Hydrological Drought Frequency Analysis in Water Management Using Univariate Distributions

[2023]

Authors: Cristian-Gabriel Anghel, Cornel Ilinca

The study of extreme phenomena in hydrology generally involves frequency analysis and a time series analysis. In this article we provide enough mathematics to enable hydrology researchers to apply a wide range of probability distributions in frequency analyses of hydrological drought. The article presents a hydrological drought frequency analysis methodology for the determination of minimum annual flows, annual drought durations and annual deficit volumes for exceedance probabilities common in water management. Eight statistical distributions from different families and with different numbers of parameters are used for the frequency analysis. The method of ordinary moments and the method of linear moments are used to estimate the parameters of the distributions. All the mathematical characteristics necessary for the application of the eight analyzed distributions, for the method of ordinary moments and the method of linear moments, are presented. The performance of the analyzed distributions is evaluated using relative mean error and relative absolute error. For the frequency analysis of the annual minimum flows, only distributions that have a lower bound close to the annual minimum value should be used, a defining characteristic having the asymptotic distributions at this value. A case study of hydrological drought frequency analysis is presented for the Prigor River. We believe that the use of software without the knowledge of the mathematics behind it is not beneficial for researchers in the field of technical hydrology; thus, the dissemination of mathematical methods and models is necessary. All the research was conducted within the Faculty of Hydrotechnics.

Parameter Estimation for Some Probability Distributions Used in Hydrology

[2022]

Authors: Cristian-Gabriel Anghel, Cornel Ilinca

Estimating the parameters of probability distributions generally involves solving a system of nonlinear equations or a nonlinear

equation, being a technical difficulty in their usual application in hydrology. The choice of probability distributions for the calculation of extreme values in hydrology is, in most cases, made according to the ease of calculation of the estimated parameters and the explicit form of the inverse probability function. This article presents improved approximations and, in some cases, new approximations for the estimation with the method of ordinary moments and the method of linear moments, which are useful for the direct calculation of the parameters, because the errors in the approximate estimation are similar to the use of iterative numerical methods. Thirteen probability distributions of two and three parameters frequently used in hydrology are presented, for which parameter estimation was laborious. Thus, the approximate estimation of the parameters by the two methods is simple but also precise and easily applicable by hydrology researchers. The new and improved approximate forms presented in this article are the result of the research conducted within the Faculty of Hydrotechnics to update the Romanian normative standards in the hydrotechnical field.

Methodology for determining hydromorphological indicators for rivers with hydropower uses

[2022]

Authors: Stefan Stanca, Alexandru Dimache, Cornel Ilinca, Cristian-Gabriel Anghel

The ecological condition of rivers is influenced by hydropower uses. The European Union encouraged the hydropower sector with installed capacities less than 10 MW, considering that their impact is small. Small hydropower plants influence the main hydromorphological indicators, namely the hydrological regime, the longitudinal connectivity of the river and the morphological conditions. This article proposes a methodology in

which hydromorphological indicators take into account the dynamics of the phenomena and processes involved, due to the variation over time of the causes and effects. The methodology proposes a score based on linear interpolation, completing the threshold values, thus being able to differentiate the negative impact on rivers. The article proposes also a series of measures to reduce the negative impact of small hydropower plants.

Flood-Frequency Analysis for Dams in Romania

[2022]

Authors: Cornel Ilinca, Cristian-Gabriel Anghel

Accurately determining the maximum designed water discharges of dams is extremely important, considering the economic costs of carrying out these types of hydrotechnical works and the possible disastrous consequences resulting from their incorrect design. This article describes and applies probability distributions used in hydrology, with some recommended by Romanian legislation standard NP 129-2011. The methods for estimating the parameters presented in this article, as well as the establishment of directions for correlating the normative with international regulations, resulting from the research on many rivers with different characteristics, conducted within the Faculty of Hydrotechnics, were completed with specialized computer applications for applying the normative. In this article, two case studies reflecting this research are presented. The verification of the proposed recommendations, on rivers with hydrographic basins with different physiographic characteristics, confirmed the opportunity to implement rigorous and simple criteria. The presentation of the quantile form of some distributions (especially Pearson III) and of the expressions of moments (central and raw) of high order, as well as the presentation of the frequency factors of each analyzed distribution necessary to calculate the confidence interval, constitute novelties, thus facilitating the ease of use of these distributions.

Breach Forming Scenarios at Concrete Faced Rock-fill Dams

[2019]

Authors: Alina Popescu-Busan, Cornel Ilinca, Serban Nicoara, Albert Constantin, Cristian Anghel

Rock-filled dams with reinforced concrete facing, as the proposed study case of Bolboci Dam on the River Ialomița, Dâmbovița County, centre Romania, are characterized by a very high operation safety. On the international level, there is no record of failed concrete faced rock-fill dams. However, during their usage there have been several incidents mainly due to the unsatisfactory behaviour of the reinforced concrete masks. Specifically, in an ICOLD statistic that presented 17 cases of damages to rock-fill dams with reinforced concrete facing, 14 were due to the unsatisfactory behaviour of the reinforced mask. The other 3 cases were due to piping phenomena or percolation through the dam foundation or the lake's shore. The failure scenarios of this dam type, Bolboci Dam including, can be as follows: the retaining structure over-spilling during floods due to an insufficient or poor operation of top and/or bottom dischargers - the overflow gradually erodes the body of the dam until the breach occurs; concentrated infiltrations with a high gradient through the dam body as a result of a serious malfunction in the concrete facing sealing, with material carving in, leading to breaches in the dam body; piping in the dam foundation / side banks that could finally lead to slippage and finally dam failure (improbable due to the existing geotechnical conditions); overpassing the safety guard of the dam's crown leading to the dam over-discharging as a result of irreversible excessive subsidence due to exceptional incidents. There have been studies on three statistical methods on how characteristic breaches occur: MLM Empirical Method, Washington State and Froehlich. The Froehlich method has been endorsed and modified, because Bolboci Dam is a well built, well executed and a well employed dam. The failure hypotheses of the dam were done with applications using MathCAD software, their algorithm being based on the finite differences method. It must be specified that the statistical approach of dam failure is a trap, due to the fact that it is well known they are a work of one of a kind engineering art. This fact shows the difficulty of the elaboration of the failure scenarios and the need of a sensitivity study for the comparison of the scenarios. The results show that the failure of rock-filled dams with reinforced concrete facing is highly improbable and leads to small flows with a sluggish evolution of the breaches.

Cracking of a concrete arch dam due to seasonal temperature variations

[2018]

Authors: Adrian Popovici, Radu Sarghiuta, Cornel Ilinca, Cristian-Gabriel Anghel

Proceedings of the 14th ICOLD International Benchmark Workshop on Numerical Analysis of Dams

The paper refers to the identification of areas with the maximum risk of cracking in the body of an arch dam located in a very cold climate zone with height temperature variation. The dam body concrete is provided with reinforcements at upstream and downstream faces which were equated making the weighted average of the gravitational and mechanical characteristics of the concrete and steel in the shells detached from the dam body to the two faces. The thermal analyses are performed in transient hypothesis for the warmest and coldest

months of the year. A sequence of two years was considered starting with cold season (September). The dam body stress state were computed taking into account 4 °C, reference temperature given by formulator. The mechanical analyses were performed in linear elastic and nonlinear concrete brittle cracking in tension and stiffness degradation in compression. The rock foundation was considered as linear elastic.

Study for Selecting the Solution of a Dam's Discharge Chute Canal

[2017]

Authors: Felipe Cisneros, Erwin Barahona, Cornel Ilinca, Cristian Anghel

Some hydraulic studies to find an adequate solution for a discharge chute canal are presented in this paper. The chute canal is appropriate work of the Lechugal 2 earth dam (H=20 m), which is part of a large irrigation system from Ecuador, presently under construction.

Studies have consisted in experiments on hydraulic model of the chute canal built at geometrical scale 1:35 and by numerical simulations in one-dimensional steady flow running HecRas software. In first stage numerical model was calibrated based on experiment results and in second stage other three constructive variants of the chute canal were analysed numerically in order to improve the solution settled by hydraulic model.

The technical performances of each variant settled by these experimental and numerical studies follow to be completed with economical analyses which will allow designer to choose the best solution for discharge chute canal.

Assessment Concerning the Domain of Applicability of Protodiakonov Method in Calculus of Underground Structures

[2017]

Authors: Adrian Popovici, Cornel Ilinca, Cristian-Gabriel Anghel

The sectional stresses (M, N) in a gallery lining are computed comparatively numerical by FEM taking into account the interaction underground structure - surrounding ground and analytical by Protodiakonov method. The last method is based on coincidence arch born in ground over gallery. Comprehensive analyses allow to settle the domain in which Protodiakonov method can be applied as well as the conditions in which discharge arches appear in ground above underground or embedded structures. The study is available for galleries (tunnels) built so that their lining takes loads from undeformed ground (rock) mass surrounding gallery, existent before excavation.

The Effects of the Structure—Foundation Interaction in the Structural Response of a TBM Gallery

[2016]

Authors: Cisneros Felipe, Juan Pablo Cabrera, Juan Gabriel Barbecho, Adrian Popovici, Cornel Ilinca

The effects of the interaction between a gallery lining and surrounding ground are evaluated. The gallery is circular with constant thickness and surrounding ground as geotechnical characteristics is soft one. Two types of ground are successively considered with bulk modulus $K = 9,260$ kPa and $K = 4,630$ kPa. The analysis is carried out for a gallery with 3.80 m inner diameter and 25 cm thickness. This under construction is part of the irrigation system of the "Los Ríos" county (Ecuador). Comprehensive computations in various hypotheses pointed out the significant effects of the interaction. The sectional stresses (M, N) in the gallery lining embedded in soft ground depend mainly of the gallery depth versus ground surface. Contrary, the mechanical characteristics of the surrounding ground resulted to have little influence.

Ghid de bune practici în vederea planificării și implementării investițiilor din sectorul microhidrocentrale

[2016]

Authors: Marius Nistorescu, Alexandra Doba, Marcel Țîbîrnac, András Attila Nagy, Diana Cosmoiu, Gavril Marius Berchi, Cornel Ilinca

Prezentul ghid de bune practici este elaborat de EPC Consultanță de mediu în cadrul contractului încheiat cu Asociația „Grupul Milvus” pentru „Elaborarea a 3 Ghiduri în vederea planificării și implementării proiectelor în sectoarele: Infrastructură de transport, Exploatare demicrohidrocentrale și Parcuri eoliene”, parte integrantă a proiectului “Natura 2000 și Dezvoltare Rurală în România” implementat de către WWF Programul Dunăre Carpați România, alături departenerii săi WWF Elveția, Asociația „Grupul Milvus”, Ecotur și Fundația ProPark. Redactarea

ghidului a fost coordonată de Marius Nistorescu, Alexandra Doba și Marcel Țîbîrnac. Experții care au contribuit la redactarea ghidului sunt: Nagy András Attila, Diana Cosmoiu, Cornelliinca, Gavril Marius Berchi.

The Influence of Soil Characteristics in Seismic Response of Embedded Structures

[2015]

Authors: Adrian Popovici, Cornel Ilinca, Răzvan Vârvorea

The seismic response of a large wastewater collector box-type is performed by spectral analysis and direct time integration methods. The influence of mechanical characteristics of surrounding soil on structure seismic response is investigated. For this purpose the soil bulk modulus was successively considered 40,000 kPa and 80,000 kPa. The study points out the kinematic interaction soil-buried structure is usually more important than inertial interaction. Over wastewater collector is placed a river channel with 2.30 m deep water. The analysis shown the water from river channel led to significant increase in structure sectional stresses during seismic action.

Influence of Dynamic Analysis Methods on Seismic Response of a Buttress Dam

[2014]

Authors: Adrian Popovici, Cornel Ilinca, Razvan Varvorea

The seismic response of a large wastewater collector box-type is performed by spectral analysis and direct time integration methods. The influence of mechanical characteristics of surrounding soil on structure seismic response is investigated. For this purpose the soil bulk modulus was successively considered 40,000 kPa and 80,000 kPa. The study points out the kinematic interaction soil-buried structure is usually more important than inertial interaction. Over wastewater collector is placed a river channel with 2.30 m deep water. The analysis shown the water from river channel led to significant increase in structure sectional stresses during seismic action.

Study on Arch Dam-Reservoir Seismic Interaction

[2013]

Authors: Adrian Popovici, Cornel Ilinca, Razvan Varvorea

Proceedings of the ICOLD - 12th International Benchmark Workshop on Numerical Analysis of Dams

The arch dam – reservoir seismic interaction is investigated using ABAQUS 6.11 and DESARC 3.1 software. DESARC computer code offers the advantage of simplicity and computation speed due to the degrees of freedom based on the stresses (Ritter modified method) being very recommended for arch dams preliminary structural analysis. The coarse mesh given by formulator was used for investigation in ABAQUS and 12 arches equally spaced on dam height were used in DESARC. The water effect was considered according to added mass procedure as well as acoustic elements. All analyses were performed in the linear elastic field. The results are presented in compliance with formulator requests: eigenfrequencies and mode shapes, hoop stresses, vertical stresses, min./max. principal stresses and radial displacements in three different sections for static and seismic loads. A special attention is paid to compare the results concerning arch dam – reservoir seismic interaction in different hypotheses applying two software.

Aspects concerning surveillance activity of the Gura Râului dam - Romania

[2013]

Authors: Dumitru Bobocu, Cornel Ilinca, Adrian Popovici

Conference: Third congress on dams / Зборник на трудови од Трет Конгрес за брани, at Republic of Macedonia, Struga

Gura Râului dam is a buttress dam of 73.50 m maximum height located on Cibin river near by Sibiu city. The dam was commissioned in 1974 year. Other characteristics of the development are the followings: - reservoir volume 15 millions m³ - crest length 328 m - upstream and downstream slopes 1:0.57 and 1:0.28 - hollow coefficient 0.70 - capacity of discharges works 603 m³/s The main use planning is to ensure 1440 l/s water supply for Sibiu city and secondary one is to produce hydroelectric energy. The dam – foundation system is well equipped with monitoring devices (4 direct pendulums, 2 inverse pendulums, 7 rockmeters with three rods, hydrometers, drainage drillings, telepressmeters etc) which besides periodically visual inspections permits to know on-line the safety state of the dam. Based on monitoring data were elaborated behaviour functions for different parameters and limit values for normal behaviour. Statistical models (Condor, EDF) and neural networks were applied for

processing the monitoring data in order to make prognosis concerning dam behaviour. Some aspects on surveillance activity made to this dam of essential importance on its safety in operation are synthetically presented and commented in the paper. Moreover some simulations of the dam behaviour with statistical method and neural networks confirm that both procedures have very good performances. Keywords: dam behaviour, monitoring, statistical models, neural networks.

The performance of the neural networks to model some response parameters of a buttress dam to environment actions

[2013]

Authors: Adrian Popovici, Tamer Ayvaz, Cornel Ilinca

Conference: 9th ICOLD European Club Symposium, "Sharing Experience for Safe and Sustainable Water Storage" at Venice, Italy

The prediction of dams response to environment actions is usually carried out by deterministic procedures based especially on finite element method (FEM) as well as statistical procedures. Although huge number of applications were performed using those procedures, application of artificial neural networks (ANN) based solution approaches is limited. In this paper, the capacity of ANN is investigated to model some response parameters of the Gura Râului buttress dam (H=73.50 m) to environment actions. With this purpose, ANN is used to model the horizontal displacements which are recorded by direct and inverted pendulum, respectively. Also, it is used to model the rods displacements measured at a rockmeter. The proposed ANN based solution model consists of three types input parameters (calendar date in numerical format, reservoir level and average daily air temperature) and two output parameters in the case of pendulums (upstream-downstream and bank-bank displacements) and three output parameters in the case of the rockmeter (rods displacements), respectively. The training of the developed ANN model is performed based on Qnet and Mathcad software packages where the values of the synaptic network weights are calculated using gradient descent method. In order to evaluate the model results, the same problem is also modelled via statistical procedures (EdF) and the results are compared in terms of the Nash-Sutcliffe model efficiency coefficient, correlation coefficient, shift and standard deviation. Identified results indicate that the proposed ANN based solution model provides identical or better results than those obtained by statistical procedures and may be effectively used to determine the dam behaviour to environmental actions.

Practical Solutions for small hydropower plant design

[2012]

Authors: Vlad Florin Piraianu, Cornel Ilinca

Conference: 18-th European Concurrent Engineering Conference at Bucharest-Romania

This paper aims to present the main results of a technical report for the construction of a small hydroelectric power plant and the results of a state of the art design based on the optimization scheme in order to achieve the maximum efficiency of the power plant and minimizing the cost of the investment.

Analysis of the sliding failure probability of a gravity dam profile based on limit equilibrium method

[2011]

Authors: Adrian Popovici, Cornel Ilinca

Conference: XI ICOLD BENCHMARK WORKSHOP ON NUMERICAL ANALYSIS OF DAMS Valencia, October 20-21, 2011 THEME C at Valencia, Spain

The limit equilibrium method was chosen to evaluate safety factor against sliding of the gravity dam cross profile for several water levels. The crack on dam foundation interface starting from dam's upstream edge is considered to develop in the contact area subject to bending tensile stresses (ν) from load combinations consisting of dead weight + hydrostatic load + uplift load.. Initially, the safety factors against sliding mode of the profile for five reservoir water levels are computed as averages of the safety coefficient values obtained for f and c pairs given by formulator (deterministic method with global safety factor). The probabilities of failure for the sliding mode of the profile for five reservoir water levels are computed using Level 2 methods (FOSM-Taylor's series, Point estimate method and Hasofer Lind method) and Level 3 method (Monte Carlo simulation). In order to compute failure probabilities the safety coefficient functions were considered to be normally distributed. A specialized computer program in the frame of MATHCAD computer code was written to perform these analysis... A comparative analysis, using SAP 2000 program, by linear elastic finite element method (FEM) for unitary system dam foundation was carried out for two reservoir water depths to compare the crack lengths versus values

obtained by limit equilibrium method. A general remark is that the crack lengths and the probabilities of failure are very sensitive with the method used for their evaluation.

DINAMICA STRUCTURILOR ȘI INGINERIE SEISMICĂ APLICAȚII VOL I. CONSPRESS, BUCUREȘTI 2011

[2011]

Authors: Adrian Popovici, Cornel Ilinca

The book in Romanian "Dynamics of structures and Seismic Engineering. Applications" is addressed especially to students from the 3rd and 4th years of the Faculty of Hydrotechnics of the Technical University of Constructions Bucharest - the sections of Sanitary Engineering and Hydrotechnical Facilities - but it can be equally useful to students from other civil engineering faculties as well as design engineers in constructions.

Cartea "Dinamica structurilor și Inginerie Seismică. Aplicații." se adresează în special studenților din anii III și IV de la Facultatea de Hidrotehnică din Universitatea Tehnică de Construcții București – secțiile de Inginerie Sanitară și Amenajări Hidrotehnice – dar poate fi în egală măsură utilă studenților de la alte facultăți de inginerie civilă cât și inginerilor proiectanți în construcții.

Upgrading of the monitoring system from Vidraru - Argeș dam, Romania

[2009]

Authors: Irinel IACOB, Mircea PECINGINE, Octavian MATEESCU, Adrian POPOVICI, Dan STEMATIU, Cornel ILINCA

Conference: COMMISSION INTERNATIONALE DES GRANDS BARRAGES at Brasilia

Vidraru arch dam (H=166.50 m) is the highest concrete dam in Romania and it was commissioned in 1965. The dam was well equipped with monitoring devices corresponding to equipment available and the specific standards that period. Upgrading of the dam monitoring system was necessary after some exceptional events during operation (1974 – large left bank sliding affecting bottom outlet no.2, 1977 –strong Vrancea earthquake M=7.4) and also in line with advances in monitoring equipment, especially electronic instruments with automated recordings and remote data transmission. New monitoring devices consisting of inverted pendulums, rockmeters, recording accelerometers, interstitial pressure cells, drainage drillings were installed in representative sections for a better supervision of the dam behavior. In 2006 started the works to automatic reading of monitoring devices and tele-transmission of data. In 2010 started the works to install an automatic data acquisition system for dam monitoring,integrated in general monitoring system (CBMS) of S.C. Hidroelectrica S.A. which operates 98 large dams. Parallel to improvement of monitoring system and quality of measurements, the processing and interpretation of data has known important progresses. Deterministic, statistical and neural networks models, behavioral functions for representative recorded parameters have been developed allowing dam surveillance in real time and timely decisions in emergency situations.

Extreme precipitation evaluation at Rosia Montana, Romania

[2007]

Authors: R. Drobot, C. Ilinca, V. Al. Stanescu, S. Larson

Conference: 2nd International Workshop on Hydrological Extremes AMHY-FRIEND group. Variability in time and space of extreme rainfalls, floods and droughts at Cosenza (Italy). Volume: 978-88-6093-054-3

For designing the hydraulic infrastructure of a huge gold exploitation based on cyanides at Rosia Montana (Romania) the evaluation of maximum precipitation is necessary. From 20 meteorological stations situated in the surrounding area, 8 stations with average and standard deviation values similar to the Rosia Montana station were selected. Distinct statistical analyses were made for the winter season (November-March) and the summer season (April-October). After obtaining the values of the 24-hour precipitation corresponding to different probabilities of exceedance, precipitation for different other duration were obtained using conversion coefficients. The winter precipitation values were combined with the maximum snowmelt value, calculated using day-degree method. The critical months are March and February, when both significant snow cover and positive temperatures can be expected. Hershfield's procedure for estimating PMP for 24 hours was distinctly applied for summer and winter periods. The summer 24-hour PMP of 450 mm was estimated, while the winter PMP is of about 380 mm. Summer PMP is similar to the winter PMP combined with extreme snowmelt.

Comments upon irreversible displacements from Bradisor arch dam. Scientific Bulletin, Technical University of Civil Engineering of Bucharest, No.1 – 2007.

[2007]

Authors: Adrian Popovici, Cornel Ilinca

[A stochastic approach to flood wave propagation on the Crisul Alb river](#)

[2006]

Authors: Radu Drobot, Cornel Ilinca

Conference: Transboundary Floods: Reducing Risks Through Flood Management

At: Transboundary Floods: Reducing Risks Through Flood Management

Volume: book series (NAIV, volume 72)

The classic Muskingum model for flood wave propagation is extended to long reaches of receiving tributaries. The flood formation conditions defined by the lag factors are treated distinctly from the river characteristics, reflected by the propagation coefficients. In the case of the Crisul Alb River, three floods (1981, 1995-1996 and 2000) were examined. Due to their different genesis, different lag values were obtained. The propagation coefficients were statistically treated and characterised by the Beta distribution.

[Practical, Effective Strategies for Surveillance at Romanian Dams](#)

[2004]

Authors: Adrian Popovici, Altan Abdulamit, Cornel Ilinca, Marius Malai

Hidro Review Worldwide (HRW), Volume 1 Nr. 6, December, 2004

[Flood propagation on Lapus river using an extended Muskingum model](#)

[2004]

Authors: Radu Drobot, Cornel Ilinca

Conference: XXII. CONFERENCE OF THE DANUBIAN COUNTRIES ON THE HYDROLOGICAL FORECASTING AND HYDROLOGICAL BASES OF WATER MANAGEMENT

At: Brno. Czech

Summary: The classic Muskingum model can be interpreted as a multiple linear-correlation. This observation is used to develop a more complex linear relationship for long reaches for which usually a repeated propagation is performed. The extended form of the Muskingum model was applied on a reach of more than 60 km of Lapus river receiving 2 important tributaries. Four historical floods (1993, 1995, 2000 and 2001) were used for model calibration and validation. The obtained results prove that this model can represent a good alternative to a successive numerical run of the classic Muskingum model.

Zusammenfassung: Das klassische Muskingum Modell kann als mehrfache Linearwechselbeziehung gedeutet werden. Diese Beobachtung wird verwendet, um ein komplizierteres lineares Verhältnis für lange Reichweiten zu entwickeln, für die normalerweise eine wiederholte Ausbreitung durchgeführt wird. Die ausgedehnte Form des Muskingum Modells wurde auf einer Reichweite von mehr als 60 Kilometern von Lapus Fluß 2 wichtige Steuerbare empfangend angewendet. Vier historische Fluten (1993, 1995, 2000 and 2001) wurden für vorbildliche Kalibrierung benutzt. Die erreichten Resultate prüfen, daß dieses Modell eine gute Alternative zu einem aufeinanderfolgenden numerischen Durchlauf des klassischen Muskingum Modells darstellen kann.

[Prediction of seepage and piezometry at Motru dam using neural network](#)

[2003]

Authors: Octavian Mateescu, Cornel Ilinca, Sanda Gheorghe

Conference: Proceedings Seventh Benchmark Workshop on Numerical Analysis of Dams

At: Bucharest-Romania

Volume: ISBN 973-8165-88-1

Abstract. The paper presents the prediction of the total seepage flow through the right abutment of the Motru dam and the piezometric levels in a selected well located area in the downstream of the dam for the period 01.01.2002 to 31.12.2002. The predictions are based on neural network model McCulloch and Pitts. The model's calibration was made based on the recorded data in the dam monitoring system, corresponding to 1990-2001 period.

Prediction of seepage and piezometry at Motru dam with statistical models

[2003]

Authors: Dan Stematiu, Cornel Ilinca, Dumitru Bobocu

Conference: Proceedings Seventh Benchmark Workshop on Numerical Analysis of Dams

At: Bucharest-Romania

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Abstract. The paper presents the prediction of the total seepage flow through the right abutment of the Motru dam and the piezometric levels in a selected well located area in the downstream of the dam for the period 01.01.2002 to 31.12.2002. The predictions are based on two statistical models, namely multiple linear regression with delay and multiple linear regression with additional response data. The model's calibration was made based on the recorded data in the dam monitoring system.

Forecast on stress-strain state generated by Alkali-Aggregate Reaction (AAR) from Pian Telesio Dam

[2001]

Authors: Adrian Popovici, Radu Sarghiuta, Altan Abdulamit, Cornel Ilinca

Conference: Sixth ICOLD Benchmark Workshop on Numerical Analysis of Dams

At: Salzburg, Austria

The prognosis at time 1999 and 2020 of some nodal displacements and stress generated at Pian Telesio arch gravity dam (H=80m) by Alkali-Aggregate Reaction (AAR) is presented in the paper. Using some monitoring data between 1970...1999 concerning reservoir water elevation, daily mean air temperatures, pendulums displacements, the effect of AAR on radial crest displacement is evaluated by statistical analysis with CONDOR model. The AAR time effect on dam body temperatures. The analysis is carried out in the dam-foundation system discretized in finite elements, provided by the formulator of the problem (ENEL Hydro-Polo Idraulico e Strutturale, Italy). The ANSYS computer code was applied in order to evaluate the required displacements and stress.