Classification of mathematical models to compute useful in the treatment of irrigation district Mexico

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Abstract.- In this paper offers a comparative analysis and classification of mathematical models and the Saint-Venant ARMAX model, and determine which is more useful for the computation applied to control systems in the first section of the main irrigation canal in the hydraulic operation Irrigation District 03 Tula Hidalgo, Mexico (DR03), The aim of this work is to obtain a mathematical model previously assessed and analyzed with respect to other, applied to the same hydrological phenomenon. reproducing with sufficient accuracy to control the characteristics of a network of microcontrollers, high-performance electronic devices, their function is the type of workstations and philosophy client - server, taking advantage of the benefits of distributed systems prone to reduce the complexities that are have a mathematician with other control devices, the network is working through the standard RS-485, and in addition to the microcontroller is included in the network, a personal computer which is responsible for performing the functions of a server.

Introduction. It is now known that almost all the water on our planet is in the form of salt water in the oceans. Only 3 percent of global water resources are freshwater, two thirds of whom come from the snow and ice in polar and mountain regions, so the fresh water constitutes only about 1 percent of the resources total water (www.fao.agua for sustainable food production, poverty alleviation and development rural.htm). The water needs careful management, which in turn requires effective public policies and regulatory frameworks. Rivers, lakes and lagoons of Mexico. Mexico's water resources consist of rivers, streams, lakes and lagoons, as well as underground storage and large masses of ocean water. There is a lot of watersheds, especially in areas where the mountains are in direct contact with the sea and the dry Altiplano endorheic, but the number of large basins that cover large parts of the country is small (INEGI, 1995 , and UNAM, 1990). where A (x, t) is the area of cross section of the channel Q (x, t), flow (discharge) side (q> 0: entry, q <0: Output); V (x, t), the mean water velocity in section A, and (x, t), the water level, x the longitudinal distance in the direction of flow, g, the acceleration of gravity, t, time; Sf (x, t), the slope of friction.

Methodology. A problem common to all methods is the numerical approximation of the terms advectivos, which generate spurious oscillations destabilize the solutions, particularly when these terms are dominant. In this work of classification models using the method of structural system, identifies a model that presents a variational formulation Petrov-Galerkin finite element which has as its key feature to add an integral term in the solution of variational Galerkin. The observed advantage of such formulation is that numerical stabilization is built from the dynamic equations. The original formulation is discontinuous in time, but particular cases also continued to represent options are explored numerically in (Carbonel, 2008). EQUATION: Moving and The flow with free surface along a canal or a river channel cross-section is described by the system of differential equations of hyperbolic type (Dronkers, 1969; Meissner, 1978):

$$\delta Q / \delta x + \delta A / \delta t = 0 \quad (1)$$

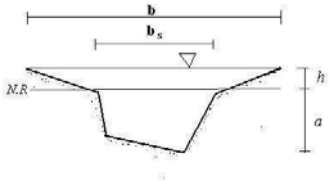
And whereas $Q = Av$ $\delta A = T\delta y$

The equation (1) becomes

$$A\delta v / v\, T\delta x + \delta y / \delta x + \delta y / \delta t = 0 \quad (2)$$

t y x where are the independent variables of time and space along the longitudinal axis of the channel respectively, g is the acceleration of gravity, q the flow rate or velocity, h the surface level of the flow with respect to the reference level (NR), a is the depth, and A is the section area, as shown in Figure 2.

Figura 2.- Área de sección.



Evaluation of mathematical model equations of Saint - Venant in the irrigation canal of the dam Taxhimay**.** When the channel is fed laterally with a supplementary spending "q" per unit length, equation (1) can be written

$\delta Q/\delta x+T\ \delta y/\delta t=q$ (3)

$$\frac{\delta v}{\delta t}+v\frac{\delta v}{\delta x}+g\frac{\delta y}{\delta x}+g\frac{\delta z}{\delta x}+gS_f=0 \quad (4)$$

The result obtained from these experiments allowed the team to two things: a) For the present project was initiated a comparative analysis of two schemes Saint - Venant implicit in the paper, another for the ARMAX model, implemented in the first stretch of the main irrigation canal "Imperial de Aragón", belonging to the Hydrographic Confederation of the Ebro, Spain, using the procedure of identification of systems from the design of the experiment to validate the model and considering the prior knowledge about the system and which will be another similar work. In particular this involves: b) Attention to extreme cases through the Saint-Venant equations, without further amended, provide satisfactory results. **Results.** As noted methods and mathematical models that have been classified as a movement of continuity and simplify the fundamental equations of Saint - Venant hydrological methods have been called, in which no detail is required in the solution for the entire length of the channel. product of this research is to design and that a network of microcontrollers in order to implement the advantages of high processing speed, the availability of electronic devices with high performance, type of work stations and philosophy client – server. In this research was to implement systems for monitoring local area networks bring various benefits such as alternative solutions. • A reliable operation in real-time hydrological phenomena. • It would allow the correction of flaws in computer programs used in the network. • Starts a step towards establishing a methodology to ensure a smooth reliable operation of the LAN microcontroller applied to the sensors to monitor the irrigation canal. • With the monitoring software, it can be concluded that the deficiencies found in the network are predictable. • The connection protocol, by its nature at the time it receives a signal error in the checksum of the header, it asks the sender to retransmit computer data packets may be corrected and recorded. • The construction of a software model itself, with two forms of representation, a graph and the other by means of expressions of entering and leaving the network channel with a friendly interface. The prediction error microcontroller network software will be possible if the signals were obtained from the algorithmic model of Saint - Venant suitable. Ie identifying stochastic phenomena such as cavitation, leakage, among others, and use the input and output matrices, and thus make inference to predict and quantify errors.