

## ABSTRACT

The primary target of this work is to develop a methodology to simulate the variables that control the quality of surface waters and particularly rivers. The aqueous complexation and gas dissolution are including between the processes that can be considered. This process can be modelled in balance or according to kinetic laws.

This type of equations has been solved by several authors using “ad hoc” methodologies. Here, I generalize those approaches with the formalism of the multicomponent reactive transport, which allows dealing rigorously all type reactions and will have to facilitate the generalization of this work. To this end, I prepared a biochemical system that included the main microbiological processes related to the elimination of organic matter, nitrification, denitrification and the evolution of dissolved oxygen in the river. I also adapted stoichiometric coefficients matrix based on the mass fractions of elements C, H, O, N and P for each considered.

Most of introduced processes they are kinetics reactions, is to say, that the speed of these reactions is based on different substances. The speed of the reaction increases of linear way with the organism’s population, but there are other substances that cause a catalización and other an inhibition in the kinetics reactions, of the Monod type. Also a set of processes in balance has been introduced in hydric natural environment.

I have made an application with the physical parameters of the average section of the Llobregat River, Barcelona. For the application has been used the average flow and the average wet perimeter, being able to obtain the other parameters necessary to start.

Also, I have created all the necessary archives for the operation of code CODE BRIGHT RETRASO, then I have determined chemical, organic and inorganic the system, of the modelled river. Then we can obtain different results of the modelled species and from the processes that generate their variation, that show the space variations throughout the time.

It is possible to be concluded, that this formal and generalized methodology of the analysis, of quality of superficial waters, is a useful tool like first approach of which can happen inside of the river, which undergoes a cloacal water spill and therefore a possible degradation of natural environment. This methodology of superficial water analysis, concretely in rivers, would help much in the accomplishment technical for its decontamination of this type of waters.