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**Various numerical methods required for solving engineering problems with mathematical software**

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**ABSTRACT**

We should try to study the proper reality using our mathematical investigation. Therefore, firstly, we show some physical and engineering situations as the real Van der Waals gas, the working of a diode, the absorbed motion of a pendulum and the filling of a tank of water with a hole in his bottom. All these problems shows mathematics through the experimentation and stimulate the interdisciplinary collaboration. We use some mathematical software programs (Derive, Matlab, etc. and also we make our own procedures in Fortran Language) to automation some process of these studies showing numeric techniques from the experimentation and the reality. Secondly, we show the real problem of the fluids flow. Due to the viscosity of them there is a lost of energy. Its calculation is complicated and the Hydraulic Institute of the United States consider the Colebrook equation as the most acceptable. However, physics and engineers use the Moody Diagrame without solving the equation. We, as mathematics, have found four different types of problems solving the numerical resulting equation in each case. In this way we have changed the diagram by a computational program solving the problem in a exactly way. We will explain some examples analyzing the solution stability.

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