> Seminario de Matemática Aplicada

DEPARTAMENTO DE MATEMÁTICA APLICADA


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# Mathematical modelling and solution of mechanical engineering problems


Leonardo da Vinci says: “"Mechanics is the paradise of the mathematical sciences, because by means of it one comes to the fruits of mathematics.".

Although a real mechanical engineering problem needs to be solved by experimental tools in a lab, most often, it requires advanced equipment and it takes a long time. This is why we, as a mechanical engineer, are interested in converting the real physical system to a simplified mathematical model and solving this model instead of the original physical problem. While the model should be as closest as possible to the real problem, it should be solvable, easily and quickly by the available mathematical tools. The mathematical tools are analytical, numerical and semi-analytical solutions. To get familiar with the mathematical modeling and solutions, I will present two of my published papers to describe two different problems arising in mechanical engineering, and explain how these problems are modeled and solved mathematically. The first problem is about hydrodynamic instability that is very significant in fluid mechanics, and the second problem is a heat transfer-based system that is important for cooling electronic devices. First, the original systems are described. Then, the original governing equations, that are usually the nonlinear partial differential equations (PDE’s) and difficult to solve, are presented. The assumptions that simplifies the original PDE’s to a simple algebraic or ordinary differential equation (ODE) are explained. Finally, the mathematical solutions of the simplified model are presented.


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| **Data** | **Mércores, 19 de xullo de 2017** |
| **Lugar** | **Aula Magna - Facultade de Matemáticas** |
| **Hora** | **11:00** |
| **Idioma** | **Inglés** |


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