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## **ENERGYPLUS SIMULATOR OF THE CIVIL ENGINEERING BUILDING OF THE IST ALAMEDA CAMPUS**

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Nowadays, energy saving is one of the big challenges that we face. A key factor to achieve it is to improve the efficiency of its use. In this context, the need to improve the climatization systems of buildings generated several computational tools that simulate their energy consumption based on mass, momentum and energy balances. These tools range from commercial applications (including license fees) to academic developments. EnergyPlus is an open source code [1] that includes a wide range of capabilities and so it has been selected to model the buildings of the IST campus. One of the most challenging cases is the Civil Engineering building due to its unique climatization system. Despite its high energy consumption, it does not provide satisfactory environmental conditions for its occupants.

This paper presents an EnergyPlus model that simulates the climatization system of the Civil Engineering building of the IST Alameda Campus. The main goal of this development is to build a tool for a reliable simulation of the operation of the building. This simulator will play an important role in the improvement of the efficiency of the climatization system of the Civil Engineering building.

The paper presents the five tasks required to construct the model in the EnergyPlus framework:

1. Geometry definition and selection of system components.
2. Specification of boundary conditions (weather conditions in the exterior).
3. Assessment of numerical errors and choice of critical discretization parameters.
4. Selection of the most suitable heat transfer correlations available in the code.
5. Calibration of the components that required modeling in the EnergyPlus system.

Finally, we present a Validation exercise to demonstrate the capabilities of the simulator.

[1] - <http://apps1.eere.energy.gov/buildings/energyplus/>, January 2015.