ABSTRACT

The most popular programs building energy simulation and more used are based on the method of response factors (REF) (Mitalas & Stephenson, 1967) to assess the thermal energy demand of buildings. It is sampled with a certain fixed frequency temperature on both sides of an enclosure and between different sampling instants supposed evolution **was linear**. This interpolation is known as forming element (EF) or holder of the sampled signal of order 1. For the temperature on each side is needed to take stock of thermal power on both surfaces of the enclosure. This leads to the balance of power is true in the sampling instants but not outside of them and therefore no calculation scheme conserves energy.

The stated objective is to obtain a method of fast and accurate simulation. The scheme should retain the power to allow the making jumps when internal loads or other excitations and the action of air conditioning systems. HVAC dynamics is rarely considered and its response time is faster than the building, so the sampling time of one hour is maintained.

The **proposed methodology** demonstrates how to apply the method of response factors using a **second order polynomial**. All under a scheme that conserves energy within the sampling points. The parabolic profile can fulfill this condition between sampling points. To check the validity of the method results from the linear function and the proposal function with the same sample rate and comparing different. As discussed, it is concluded that there is greater precision in temperature and the energy transferred to the air.

This thesis proposes to replace it, the trainer of order 1 with another element of order 2. To shape the evolution of temperatures on each side of the enclosure, in addition to the balance of powers balance of power is required so the scheme calculation is conservative. The proposed method gives a similar increase the sampling frequency with a lower precision computation time.

Therefore, it is intended through this thesis lay the theoretical and methodological basis of a new model for calculating heat transfer in walls to meet the current needs of accuracy and speed in the process of designing both buildings but especially new and existing renovation strategies.