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Investigating the Characterisation of Temperatures Within New Zealand Buildings

A thesis presented in partial fulfilment
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“Science is facts; just as houses are made of stones, so is science made of facts; but a pile of stones is not a house and a collection of facts is not necessarily science.”
– *Henri Poincaré*

ABSTRACT

The variations in indoor temperatures between New Zealand buildings can be due to differences in the behaviour of the occupants (for example how frequently the building is occupied) or due to physical differences between the buildings (such as differing insulation levels or degree of shading).

This thesis will look at some physical processes that give rise to temperature variations and will look to see how the overall variation in temperatures is affected by these physical properties.

One systematic physical process affecting the indoor temperature within a building occurs when the area being considered is small (such as the living room of a house) and the degree of heat flow into the room is reasonably large, the temperature within the room will then have a tendency to increase with height resulting in a vertical temperature gradient. Detailed vertical temperature distributions are examined for two houses.

Another source of variation is the differences in temperatures throughout a building. This examines the extent to which buildings are only partially heated. This has briefly been examined in this thesis by examining the contrasts between the temperature measurements throughout a set of nine houses.

Some sources of physical temperature variation within a building can be unpredictable. Localised temperature anomalies can be due to the presence of specific heat flows (frequently from household appliances). This thesis contains examples of these localised sources and provides guidance for placing temperature sensors to minimise localised effects.

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