Studies of Heat Dynamics in an Arctic Low-energy House

A low energy house situated in Sisimiut, Greenland is used as study object for analysis of dynamic thermal properties of energy efficient buildings. The building is instrumented with a number of energy meters and thermal sensors, and these thermal data are logged with fine time intervals. Statistical methods are being developed in a PhD project to derive the properties to be used in a dynamic thermal model of the whole building. Characteristic of the building is its exposure to the extreme Arctic climate, which is both very cold and where the sun in some periods may shine constantly, or not at all. The house is equipped with a weather station measuring temperature, solar radiation, wind speed and direction. The building is highly energy efficient and its performance has been followed since its inception in 2005. The energy efficiency of the building is due to good thermal insulation, large energy-efficient windows, and heat recovery. The house is divided into two symmetric apartments, of which one is inhabited by a family, and the other is used for experiments and demonstration. The situation provides unique options for measuring and analysis with large signal to noise ratios facilitating observation of thermal response to external temperatures, solar radiation, wind, user behaviour, and heating.