

Abstract

This is a study of the structural performance of modular buildings with triangularly-shaped modules when compared with rectangular modules. Three distinct designs for triangular structural modules were created and tested against one another as well as control designs using equivalent rectangular modules. All models used in this experiment were analyzed using Autodesk Robot and also designed using the software's postprocess design program. From this initial alternatives selection process, an 8' by 12' isosceles triangular structural module was found to be most efficient. This module was then used to design two full-sized residential multi-story buildings made entirely from the module, one with a central structural core and one without. These two triangular modular buildings were then compared in terms of both lateral and vertical structural performance against an equivalent rectangular modular building. From these comparisons it was found that the triangular modular building has a significant advantage in structural strength over the conventional alternative in all directions of loading when used in a building without a central structural core, but only a marginal advantage under high loading conditions when used with a structural core.