

New construction ideas for special housing complexes

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1 Abstract

The problems concerning the design, construction and use of buildings in a city environment or even other, less dense, environments, constitute a complex scenario in which various different disciplines are called to give their contribution: energy efficiency, reduction of the footprint, comfort, affordability and new living standards all play a key role in the design of new housing solutions. In the present paper, a new design idea is presented for the construction of buildings, capable of guaranteeing a high level of comfort for the users while safeguarding the surrounding territory. The proposed system, named GEODE, consists of a 120m diameter spherical steel or concrete structure with internal cores acting as shear-resistant elements. The shell contains five decks supported by mega-beams, on which 5-story high buildings can be erected, following design guidelines that have as a primary objective the preservation of high livability conditions. Among the defining characteristics of the system are its enhanced performance with respect to buildings of equal volume but different shape and the possibility of building the spherical shell using two different structural materials. These are distinctive features, which allow for the construction of small self-sufficient cities that synergically interact with their surrounding environment. In the present paper, an initial feasibility study is presented while the performance of different possible structural solutions, i.e. using R.C. or steel elements, are compared.

Keywords: Building systems; hyper buildings; reinforced concrete; sustainable housing; high-rise buildings; spherical shell; mega-floor; user comfort.