New modeling approach for the deformation of fractal hierarchical structures. CATALIN PICU, MONICA SOARE, Rensselaer Polytechnic Institute — A new formulation is proposed to address the deformation of multiscale hierarchical structures with a self-similar geometry across scales for which the classical formalism of continuum mechanics either does not apply or it is too expensive from computational point of view. Examples of such structures are porous materials (rocks, aerogels, glasses) in which pores with a wide range of dimensions are found, many biological materials and some of the newly developed nanostructured hierarchical composites. To this end, the equations of solid mechanics are reformulated to include information about the geometry. The procedure to solve boundary value problems with the new formulation will be presented. Examples will be discussed in which the variation of the solution with the number of scales in the hierarchy is studied.

Catalin Picu
Rensselaer Polytechnic Institute