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**Assessment of models and methods for pressurized spherical composites.** (English)

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**Summary:** The elastic properties of a spherical heterogeneous structure with isotropic periodic components is analyzed and a methodology is developed using the two-scale asymptotic homogenization method (AHM) and spherical assemblage model (SAM). The effective coefficients are obtained via AHM for two different composites: (a) composite with perfect contact between two layers distributed periodically along the radial axis; and (b) considering a thin elastic interphase between the layers (intermediate layer) distributed periodically along the radial axis under perfect contact. As a result, the derived overall properties via AHM for homogeneous spherical structure have transversely isotropic behavior. Consequently, the homogenized problem is solved. Using SAM, the analytical exact solutions for appropriate boundary value problems are provided for different number of layers for the cases (a) and (b) in the spherical composite. The numerical results for the displacements, radial and circumferential stresses for both methods are compared considering a spherical composite material loaded by an inside pressure with the two cases of contact conditions between the layers (a) and (b).

**MSC:**

74E30 Composite and mixture properties

74Q05 Homogenization in equilibrium problems of solid mechanics

**Keywords:**

spherical composites; mechanical properties; elasticity; analytical modeling; numerical analysis

**Full Text:** [DOI](#) [HAL](#)

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