

**NEW RESULTS
IN CONSTRUCTION OF THE GREEN'S MATRICES
IN SPHERICAL COORDINATES**

VICTOR SEREMET – *AGRARIAN STATE UNIVERSITY OF MOLDOVA*
MIRCESTI STREET 44, CHISINAU, 2049, MOLDOVA
(37322) 29-49-87/ (37322) 43-21-61
v.seremet@uasm.md

GUY BONNET – *UNIVERSITE PARIS EST 5 BOULEVARD
DESCARTES, 77454 MARNE LA VALLEE, CEDEX 2, FRANCE*
01 60 95 72 20 / 01 60 95 77 99
guy.bonnet@univ-paris-est.fr

TATIANA SPEIANU— *AGRARIAN STATE UNIVERSITY OF MOLDOVA*
MIRCESTI STREET 44, CHISINAU, 2049, MOLDOVA
(37322) 29-49-87/ (37322) 43-21-61
t.speianu@uasm.md

This paper proposes for the first time the general integral representations for domain Green's displacement matrices in spherical system of coordinates. There is defined the notion of a generalized spherical influence element. A new theorem related to such an element is demonstrated. This theorem enables us to derive the domain influence function for the volume dilatation and for domain Green's matrices for a wide class of mixed boundary value problems of the theory of elasticity for spherical domains. This class includes boundary value problems for bodies resting on sliding fixed supports, which do not allow any rotation. A handbook of domain Green's displacement matrices based on this theorem may be easily generated. Most of them will be obtained in closed form that is very important for their numerical implementation. The domain Green's matrices for unlimited elastic space and a wedge supported on its whole surface on sliding fixed supports expressed firstly in terms of elementary functions is derived as a typical example. The integral formula for displacements, which represents an extension from the theory of harmonic potentials to the theory of elasticity potentials for the wedge, is derived.

Keywords: Generalized spherical influence elements, Green's matrix and integral solutions.

References

- [1] Melnikov, Yu.A., Influence Functions and Matrices, Marcel Dekker, New York, USA, 1998.
- [2] Nowacki, W., Theory of elasticity, Mir, Moscow, USSR, 1975, (in Russian).
- [3] Seremet, V.D., Handbook on Green's Functions and Matrices, WITpress, Southampton and Boston, 304pag.+CD ROM 232pag., UK&USA, 2003.
- [4] Seremet Victor, Influence Elements Method, State Agrarian University of Moldova: Publisher Center of UASM, Chisinau, Moldova, 2003, 260 pag. 2003 (in Romanian).
- [5] Seremet V.D. Some New Results in Constructing of 3D Green's Matrices. Proceedings of the 15th ASCE Engineering Mechanics Conference (EM 2002), Columbia University in the city of New York, USA, 2002 8 p.
- [6] Victor D. Seremet, Dan Precupan, Ioana Vlad and Adrian V. Seremet, The constructing of Green's matrices in cylindrical co-ordinates Proceedings of the 17th ASCE Engineering Mechanics Conference (EM 2004), University of Delaware Newark, DE, USA, 2004 9 p.
- [7] Tihonov, A.N. and A.A. Samarskii Equations of Mathematical Physics, Moscow, Nauka, 735p. 1972 (in Russian).