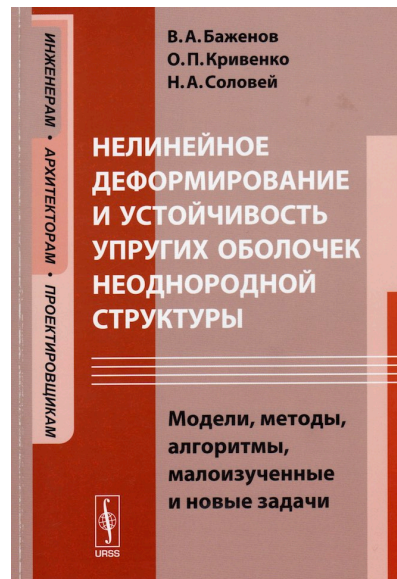




**Professor Nikolai A. Solovei (Solovey)
(1946 –2014)**



Bazhenov B.A, Krivenko O.P., Solovei N. A. “Nonlinear deformation and stability of elastic shells of inhomogeneous structures: Models, methods, algorithms, poorly studied and new problems” [in Russian] – Moscow: Publishing house “LIBROKOM”, 336 p.(2013).

BIOGRAPHY AND CAREER:

Professor Nikolai Aleksandrovich Solovei was born on September 21, 1946 in Kyiv, Ukraine, in a family of civil engineers and architects. Continuing the family tradition, he entered the Kyiv Civil Engineering Institute, now Kyiv National University of Construction and Architecture, in 1964. Since then, his whole life was connected with University.

EDUCATION:

Graduated from the Kyiv Civil Engineering Institute (Construction department), Ukraine, 1969.

PhD (Structural Mechanics), Kyiv Civil Engineering Institute, 1980.

Dr. Techn. Sciences (Structural Mechanics), Kyiv National University of Construction and Architecture, 2009.

Thesis: “Stability and postbuckling behavior of elastic inhomogeneous shells under thermomechanical loads”; Scientific consultant Prof. Victor A. Bazhenov.

Awarded the academic title of Professor of Structural Mechanics, 2012.

Member of the National Committee of Ukraine on Theoretical and Applied Mechanics, 2013.

POSITIONS: Worked at Kyiv National University of Construction and Architecture:

at Scientific Research Institute of Structural Mechanics:

as an Engineer, Junior researcher, Senior researcher and Leading researcher (1969-2006);

at Department of structural mechanics: as Associate Professor (2006-2009), Professor (2009-2014).

Professor Nikolai A. Solovei died on March 31, 2014.

MAIN RESEARCH INTERESTS:

Nonlinear theory of flexible elastic inhomogeneous shells under static action of thermomechanical loads; numerical research of thermoelastic deformation and buckling of a wide class of thin shells of inhomogeneous structure; algorithmization of computational processes, development of computer systems.

GENERAL FIELDS OF WORK:

Prof. Solovei made a significant contribution to the development and solution of the problems faced by modern structural mechanics – the development of theoretical principles, a general method and computational procedures for numerical study of stability and buckling of a wide class of thin elastic inhomogeneous shells with complex shape and structure subjected to mechanical and thermal loads. He developed the new universal spatial ISO-parametric finite element with additional variable parameters.

It had allowed developing a unified design model that describes the multilayer structure of a material and geometrical features of structural elements of flexible shells of complex shape. These geometrical features include casing of varying thickness, ribs, cover plates, cavities, channels, holes, sharp bends of the mid-surface, a multilayer structure material with the ability to track its curvilinear anisotropy.

He developed an efficient iterative algorithm for solving problems of nonlinear deformation, buckling, and postbuckling behavior of thin inhomogeneous shells under thermo-mechanical loading. Procedures for the identification of singular (branching and critical) points on the “load–deflection” curve and the automatic correction of algorithm parameters were implemented. The joint action of mechanical and temperature fields on a shell was considered as a single process for which relations between the load parameter and the parameters of the temperature and mechanical fields were given.

PAPERS:

More than 110 publications, including 2 monographs.

MAIN PAPERS:

Bazhenov V. A., Solovei N. A. Nonlinear Deformation and Buckling of Elastic Inhomogeneous Shells under Thermomechanical Loads / International Applied Mechanics, Vol. 45, No. 9 (2009).

<https://link.springer.com/article/10.1007/s10778-010-0236-1>

Bazhenov V. A., Solovei N.A. Nonlinear deformation and stability of elastic inhomogeneous shells under thermal-force loading / Progress mechanics. In 6 volumes. edited by A.N. Guzya. Vol. 6 (Book 2). – K.: Litera LTD, 2012. – p. 609-645.

Abstract. The paper outlines the fundamentals of the method of solving static problems of geometrically nonlinear deformation, buckling, and postbuckling behavior of thin thermoelastic inhomogeneous shells with complex-shaped mid-surface, geometrical features throughout the thickness, or multilayer structure under complex thermomechanical loading. The method is based on the geometrically nonlinear equations of three-dimensional thermoelasticity and the moment finite-element scheme. The method is justified numerically. Results of practical importance are obtained in analyzing poorly studied classes of inhomogeneous shells. These results provide an insight into the nonlinear deformation and buckling of shells under various combinations of thermomechanical loads.

Bazhenov V. A., Krivenko O. P., Solovei N. A. Nonlinear deformation and stability of elastic shells with inhomogeneous structure. Kyiv: CJSC “VIPOL”, 316 p. (2010) [in Ukrainian].

Supplemented and revised edition:

Bazhenov V.A., Krivenko O.P., Solovei N.A. Nonlinear deformation and stability of elastic shells of inhomogeneous structure: Models, methods, algorithms, poorly-studied and new problems. – Moscow: publishing house "LIBROKOM", 336 p. (2013) [in Russian].

Abstract. The monograph deals with the development of the finite element method for geometrically nonlinear deformation, buckling, and postbuckling behavior of a wide class of thin elastic inhomogeneous shells with complex form and structure under combined thermomechanical loading. The approach is based on the uniform methodological positions of three-dimensional thermo-elasticity with using of the geometrically nonlinear equations and the moment finite-element scheme. A universal spatial finite element with the additional variable parameters has been developed. On the basis of this element it has been constructed a design model that describes the multilayer structure of a material and geometric features of structural elements of inhomogeneous shells: casing of varying thickness, ribs, cover plates, cavities, channels, holes and the midsurface with the sharp bends. The reliability of linear and nonlinear solutions for a wide class of inhomogeneous shells subjected to thermal and mechanical loads has been numerically justified by analyzing their convergence and comparing with those obtained by other authors. By solving poorly studied problems, we have been obtained results, which allowed us to better understand the nonlinear deformation, buckling, and postbuckling behavior of inhomogeneous shells under change of the modes of thermomechanical loading.

Kislookii V.N., Sakharov A.S., and Solovei N.A. Moment scheme of the finite-element method in geometrically nonlinear problems regarding the strength and stability of shells / *Strength of Materials*, **9**, No. 7, 808–817 (1977). <https://link.springer.com/article/10.1007/BF01529016>

Kislookii V.N., Legostaev A.D., Sakharov A.S., Solovei N.A., Il'chenko E.N., and Kritskii V.N. Prochnost'-75. Three-Dimensional Structures Design Software System, Part III, Section Distos: Statics and Dynamics of Shell Structures [in Russian], Manual Inv. No. 5759 dep. at RFAP IK AN USSR, Kyiv (1980) [in Russian].

Kislookii V.N., Koval'chuk N.V., Legostaev A.D., and Solovei N.A., Stability analysis of reinforced slightly conical shells with large holes in geometrically nonlinear formalism / *Int. Appl. Mech.*, **20**, No. 11, 1037–1042 (1984).

<https://link.springer.com/article/10.1007/BF00886696>

Kiricevskij, V.V.; Sacharov, A.S.; Solovej, N.A. FEM-Algorithmen fur geometrisch und physikalisch nichtlineare Aufgaben der Statik und Stabilitat raumlicher Konstruktionen. Technische mechanik 8 (1987) 2. S. 63-70 [in German].

Solovei N.A. Implementation of an algorithm for solving systems of nonlinear equations in buckling problems for shells in PROCHNOST'-75 / *Computational and Applied Mathematics*, vol. **62**, p. 39–51 (1987) [in Russian].

Koval'chuk N.V. and Solovei N.A. The stress-strain state and stability of conical shells / *Int. Appl. Mech.*, **24**, No. 5, 484–488 (1988). <https://link.springer.com/article/10.1007/BF00883070>

Bazhenov V.A., Solovei M.O. and Krivenko O.P. Stability of shallow shells of revolution with linearly varying thickness / *Aerospace engineering and technology*. - 2004. - N 2 (10). - P. 18-25.

Bazhenov V.A., Krivenko O.P., and Solovei N.A. Assessment of the curvature effect on the stability and postbuckling behavior of ribbed panels / *Strength of Materials*, **39**, No. 6, 658–662 (2007). <https://link.springer.com/article/10.1007/s11223-007-0075-4>

Podgorny A.L., Grin'ko E.A., Solovei N.A. On the study of new forms of surfaces with respect to structures of various purposes / RUDN Journal of Vestnik of Engineering researches. – 2013. – □ 1, p. 140-145.

<http://journals.rudn.ru/engineering-researches/article/view/4746>

Bazhenov V.A., Solovei N.A., Krivenko O.P. Modeling of Nonlinear Deformation and Buckling of Elastic Inhomogeneous Shells / Strength of materials and theory of structures – □.: □NUSA, 2014. – No. 92. – pp. 121-147. <http://opir.knuba.edu.ua/files/zbirnyk-92/12.pdf>.

Bazhenov V.A., Solovei N.A., Krivenko O.P., Mishchenko O.A. Modeling of nonlinear deformation and buckling of elastic inhomogeneities shells / Structural mechanics of engineering constructions and buildings, (2014), No. 5, pp. 14-33 [in Russian].

<http://journals.rudn.ru/structural-mechanics/article/view/11217>

Solovei N.A., Krivenko O.P., Malygina O.A. Finite element models for the analysis of nonlinear deformation of shells stepwise-variable thickness with holes, channels and cavities / Magazine of Civil Engineering, No.1, 2015. – P. 56-69 [in Russian].

http://engstroy.spbstu.ru/eng/index_2015_01/06.html

Solovei N.A. Determination of the geometric characteristics by computer analysis of strength problems of shells with complex shape / Strength of materials and theory of structures, 1972. - Vol. XYI, pp. 61-65 [in Russian].

Kislookii V.N., Skoromnyi I.G., Solovei N.A. Numerical construction of minimal surfaces to the curved contour / Strength of materials and theory of structures, 1973. - Vol. XX, pp. 115-123 [in Russian].

Goncharenko I.E., Kislookii V.N., Legostaev A.D., Sakharov A.S., and Solovei N. A., The finite element method for non-shallow shells of complex shape. / Strength of materials and theory of structures, 1974. - Vol. XXIV, pp. 16-25 [in Russian].

Goncharenko I.E., Legostaev A.D., and Solovei N.A. Investigation of the non-shallow shells stress state with complex configuration in linear formalism. In proc. of the "Organization and methodology of structural design with the use of computer and organizational technology." Vol. 2, Moscow: SNIPES of Gosstroy of the USSR, 1974, pp. 11-16 [in Russian].

Kislookii V.N., Legostaev A.D., Sakharov A.S., and Solovei N.A. A variant of the finite element method in problems of statics and dynamics of cantilever shells. / Strength of materials and theory of structures, 1975. - Vol. XXVII, pp. 45-51 [in Russian].

Kislookii V.N., Sakharov A.S., and Solovei N.A. Finite element analysis of plates with curved edges / Structures, 1976. Vol. □□YII. Kiev: "Budivelnik", pp. 71-76 [in Russian].

Sakharov A.S. and Solovei N.A. Convergence analysis of the finite-element method in problems of plates and shells. In: Spatial Structures of Buildings and Installations Issue 3, Moscow: Stroiizdat (1977), pp. 10–15. [in Russian].

Legostaev A.D., Solovey N.A. System of mathematical support of calculations of plate-shell structures. - In: Complex calculation of buildings and structures with the use of computers. □iev: KISI, 1978, p. 137-142 [in Russian].

Galushchak O.V., Kislookii V.N., Kuptsov V.I., Sakharov A.S., Solovei N.A. Finite element analysis of statics and stability of reinforced composite shells / Numerical methods for solving problems of structural mechanics. Kiev:KISI. (1978). Pp. 88-93 [in Russian].

- Solovei N.A. Analysis of the stress-strain state of the coatings of the panels in linear and geometrically nonlinear formalism / Strength of materials and theory of structures, 1982. vol. 40. pp. 26-32 [in Russian].
- Solovei N.A., Khrakovsky A.I. Finite element analysis of a flexible plate of the band saw type / Strength of materials and theory of structures, 1982, vol. 41, p. 39-42 [in Russian].
- Solovei N.A. Analysis of the stress-strain and stability of plates and shells with stepwise-variable stiffness using a modified finite element / Strength of materials and theory of structures, vol. 43, pp. 30-35 (1983) [in Russian].
- Solovei N. A., Tregubova I. A., and Mazurkov O. A. Calculating the exact volume of curvilinear finite elements / Applied Geometry and Engineering Graphics, Kiev: Budivel'nyk, 48, p. 40-44 (1989) [in Russian].
- Solovei N. A., Tregubova I. A. Numerical definition of the geometry finite element shell models / Applied Geometry and Engineering Graphics, Kiev: Budivel'nyk, p. 40-44 (1990) [in Russian].
- Solovei N.A. Analysis of geometrically nonlinear buckling problems for ribbed multilayer shells based on the moment finite-element scheme / Strength of materials and theory of structures, vol. 60, p. 110-117 (1992).
- Solovei N.A., Krivenko O.P. Maksimenko T.P., Karpov A.E. Automation of the geometry finite element models of shells / Applied Geometry and Engineering Graphics, Kiev: Budivel'nyk, p. 109-112 (1994) [in Russian].
- Solovei N.A., Krivenko O.P., Sedletskaia N.E. Tereshchenko Yu.V. System of generation of finite element models of shells with complex shape / Applied Geometry and Engineering Graphics, Kiev: Budivel'nyk, vol. 63, p. 48-52 (1998) [in Ukrainian].
- Bazhenov V.A., Solovei N.A., and Krivenko O.P. Nonlinear equations of deformation of ribbed thin multilayer shells under thermomechanical loading / Strength of materials and theory of structures, vol. 64, p. 116-127 (1998) [in Ukrainian].
- Bazhenov V. A., Solovei N.A., Krivenko O. P., and Ayat N. Stability of flexible shells under combined thermomechanical loading / Strength of materials and theory of structures, vol. 65, p. 75-90 (1999) [in Ukrainian].
- Solovei N.A. and Krivenko O.P. Effect of curvature on the stability of flexible shallow panels subject to nonuniform heating / Strength of materials and theory of structures, vol. 66, p. 18-21 (1999) [in Ukrainian].
- Bazhenov V.A., Solovei N.A., and Krivenko O.P. Equations of the moment finite-element scheme in buckling problems for inhomogeneous shells under thermomechanical loading / Strength of materials and theory of structures, vol. 66, p. 22-25 (1999) [in Ukrainian].
- Bazhenov V.A., Solovei M.O., and Krivenko O.P. Stability of smooth, ribbed and weakened flexible shallow panels / Strength of materials and theory of structures, vol. 67, p. 92-103 (2000) [in Ukrainian].
- Bazhenov V.A., Solovei M.O. and Krivenko O.P. Stability of flexible shallow panels with stepwise-varying thickness / In: *System Technologies: Mathematical Problems of Engineering Mechanics* [in Ukrainian], Issue 2, Dnepropetrovsk (2001), pp. 7-11.
- Bazhenov V.A., Dekhtyaryuk E.S., Solovey N.A., Krivenko O.P. Formation of finite element models of shells of complex shape / Architecture of shells and strength calculation of thin-walled and machine-building structures of complex shape: Proceedings of the International Scientific Conference. - Moscow: Publishing House of RUDN, 2001. - P. 30-34.

- Bazhenov V.A., Solovei M.O. and Krivenko O.P. Effect of the parameters of ribs on the stability of flexible panels / Strength of materials and theory of structures. Issue **69**, 18–24 (2001) [in Ukrainian].
- Solovey N.A. Geometrical modelling of shells with complex form by finite element system for strength analyses / Applied Geometry and Engineering Graphics, Kiev: KNUBA Issue 69, pp. 245-251 (2001) [in Ukrainian].
- Solovei N.A. and Krivenko O.P. Comparative analysis of solutions to problems of buckling flexible shells subjected to different laws of nonuniform heating / Strength of materials and theory of structures. Issue **70**, 104–109 (2002) [in Ukrainian].
- Bazhenov V.A., Solovei N.A. and Krivenko O.P. Effect of variable thickness on the stability of shallow panels under uniform pressure / In: System Technologies: Mathematical Problems of Engineering Mechanics [in Ukrainian], Issue 4, Dnepropetrovsk (2003), pp. 15–20.
- Solovei N.A., and Krivenko O.P. Stability analysis of smooth (with linearly varying thickness) and faceted (with stepwise varying thickness) shallow spherical shells / Strength of materials and theory of structures. Issue **72**, 83–96 (2003) [in Ukrainian].
- Solovei N.A. Modeling the thermoelastic properties of multilayer materials in problems of buckling inhomogeneous shells / Strength of materials and theory of structures. Issue **73**, 17–30 (2003) [in Ukrainian].
- Solovei N.A., and Krivenko O.P. Effect of heating on the stability of smooth shallow spherical shells with linearly varying thickness / Strength of materials and theory of structures. Issue **74**, 60–73 (2004) [in Ukrainian].
- Solovei N.A. and Krivenko O.P. Effect of heating on the stability of faceted shallow spherical shells / Strength of materials and theory of structures. Issue **75**, 80–86 (2004) [in Ukrainian].
- Bazhenov V.A., Krivenko O.P., and Solovei N.A. Effect of thermo-mechanical loading conditions on the stability and postbuckling behavior of shells with constant and stepwise-varying thickness / Strength of materials and theory of structures. Issue **77**, 30–42 (2005). [in Ukrainian].
- Solovei N.A. A modified three-dimensional finite element for modeling thin inhomogeneous shells / Strength of materials and theory of structures. Issue **80**, 96–113 (2006) [in Ukrainian].
- Bazhenov V.A., Krivenko O.P., and Solovei N.A. Stability of conical shells with linearly varying thickness / Strength of materials and theory of structures. Issue **78**, 46–51 (2006) [in Ukrainian].
- Bazhenov V.A., Krivenko O.P., and Solovei N.A. Convergence and accuracy of solutions for a spatial finite element in problems of nonuniform heating of rods and beams / Strength of materials and theory of structures. Issue **80**, 54–65 (2006) [in Ukrainian].
- Bazhenov V.A., Krivenko O.P., and Solovei N.A. Analyzing solutions of buckling problems for shells with temperature-dependent material properties / Strength of materials and theory of structures. Issue **79**, pp. 73-81 (2006) [in Ukrainian].
- Solovey N.A., Krivenko O.P., Kalashnikov A.B. Comparative results analysis of calculations the stability of thin elastic shells / Strength of materials and theory of structures. Issue **83**, pp. 63-73 (2009) [in Ukrainian].
- Solovey N.A., Krivenko O.P., Kalashnikov A.B., Tamilkko O.A. Comparative analysis of a stability of axially-symmetric shells with the linear-variable thicknesses / Strength of materials and theory of structures. Issue, pp. 89-96 (2009) [in Ukrainian].

Solovey N.A., Krivenko O.P., Myschenko O.A. Comparative analysis of a nonlinear deformation and stability of shallow shells with the stepwise -variable thicknesses / Strength of materials and theory of structures. Issue 86, pp. 131-139 (2010) [in Ukrainian].

Solovey N.A., Krivenko O.P., Dubyna O.S. Comparative analysis of approaches to stability of flexible spherical panels with constant thickness under action of uniform pressure / Strength of materials and theory of structures. Issue 87, pp. 22-28 (2011) [in Ukrainian].

Kryvenko O.P., Solovey N.A. Effect of heating on buckling of shallow panels at change of conditions of fixation of the boundary / Strength of materials and theory of structures. Issue 87, pp. 144-152 (2011) [in Ukrainian].

Bazchenov V., Krivenko O., Solovey N. The effect of preheating on the stability of shallow rectangular panels under combined fixation the edge / Strength of materials and theory of structures. Issue 89, pp. 107-116 (2012) [in Ukrainian].

Solovey N.A., Kryvenko O.P., Myshchenko O.A., Kalashnikov O.B. Composite material characteristics consideration in a finite elements model of a inhomogeneous shell / Strength of materials and theory of structures. Issue 89, pp. 172-180 (2012) [in Ukrainian].

Solovey N.A., Kryvenko O.P., Kalashnikov A.B. Effect of pre-heating on the loss of stability of shallow shells under the action of pressure / Strength of materials and theory of structures. Issue 90, pp. 143-157 (2012) [in Ukrainian].

Bazhenov V.A., Solovei N.A., Krivenko O.P., Mishchenko O.O., Kalashnikov A.B. Analyses of stability of thin elastic shells of constant and linearly variable thickness / Structural mechanics and building structures: a Collection of articles. – M.: Publishing house of the SCAD SOFTWARE, 2013. – P. 27-33.

Bazhenov V.A., Krivenko O.P., Solovei N.A. Mass matrix of the modified solid finite element for inhomogeneous shells / Strength of materials and theory of structures. Issue 91, pp. 114-125 (2013) [in Ukrainian].

Solovei N.A., Krivenko O.P., Mishchenko O.A. Comparative analysis of nonlinear deformation and stability of elastic shells of inhomogeneous structure / Problems of development of the urban environment. Kiev: NAU. Issue 2 (12). pp. 228-236 (2014) [in Russian].

Solovei N.A., Krivenko O.P., Myshchenko O.O. Determination of the effective physics-mechanical characteristics of unidirectional fiber composite material / Strength of materials and theory of structures. Issue 92, pp. 30-49 (2013) [in Ukrainian].