Solving Symbolic and Numerical Problems in the Theory of Shells with *MATHEMATICA*®

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The aim of the lecture is to show how, thanks to the computer algebra system *MATHEMATICA*® [1] and its external package ***MathTensor***™[2], it is possible to solve symbolic and numerical tasks in the theory of shells.

The lecture will cover the following problems:

1. **Computer assisted tensor analysis of shell tasks**
   Application of the computer algebra system to solve tensor symbolic problems. Derivation of *MATHEMATICA*® differential equations from tensor ones. Receiving and simplification of the constitutive relations and strain energy density. Numerical examples.

2. **Shell geometry with *MathTensor*™**
   Application of ***MathTensor***™ to translate relations of differential geometry to the *MATHEMATICA*® language.

3. **Description of an arbitrary shell**
   Geometrical properties, kinematic relations, strains, internal forces and differential equations.

4. **Shells boundary value problems with least squares method**
   The refined least squares method was implemented into the computer algebra. The method is very useful for the boundary value problems of shells as they are typical problems of boundary layer. The advantages of the method.

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[1] *MATHEMATICA*® is a product of Wolfram Research, Inc.
[2] ***MathTensor***™ is a product of MathSolutions, Inc.