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STRAIN BASED FINIT ELEMENT FORMULATION FOR THE ANALYSIS OF
HOMOGENEOUS PLATES

Assoc. Prof. Dr. Gulbaxar TAVALDIeva
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Chemical Technology
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Prof. Dr. Bahri BAŞARAN
Assist. Prof. Dr. Aysun BALTACI

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Prof. Dr. Bahri BAŞARAN
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STRAIN BASED FINIT ELEMENT FORMULATION FOR THE ANALYSIS OF HOMOGENEOUS PLATES

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ABSTRACT

In this work, a new type of quadrilateral finite element is introduced, which is based on the strain approach and the first-order shear deformation theory for analyzing static plates. This novel element consists of four nodes and has six essential degrees of freedom per node. It is obtained by combining two strain-based elements: the first element represents a membrane with three degrees of freedom per node, while the second element represents a Reissner-Mindlin plate with three degrees of freedom per node. The displacement field of this newly developed element incorporates higher-order terms and is defined using assumed strain functions that satisfy compatibility equations. To evaluate the performance of the proposed element, several tests are conducted, and the results are compared against existing solutions in the literature. The outcomes demonstrate that the suggested element exhibits excellent accuracy and efficiency in predicting plate bending.

Keywords: Strain approach . Finit element. Mindlin plate