# Article information:

A geometrically non‐linear piezoelectric solid shell element based on a mixed multi‐field variational formulation - Klinkel - 2006 - International Journal for Numerical Methods in Engineering - Wiley Online Library  
<https://onlinelibrary.wiley.com/doi/abs/10.1002/nme.1447>

# Article summary:

1. This paper presents a geometrically non-linear solid shell element to analyse piezoelectric structures.

2. The finite element formulation is based on a variational principle of the Hu–Washizu type and includes six independent fields: displacements, electric potential, strains, electric field, mechanical stresses and dielectric displacements.

3. Linear and non-linear numerical examples demonstrate the ability of the proposed model to analyse piezoelectric devices.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article is generally reliable in terms of its content and claims made. It provides a detailed description of the proposed model for analysing piezoelectric structures, including its features such as eight nodes with four nodal degrees of freedoms, three displacements and the electric potential, as well as its ability to model arbitrary curved shell structures and incorporate a 3D-material law. The article also provides linear and non-linear numerical examples to demonstrate the effectiveness of the proposed model in analysing piezoelectric devices.

However, there are some potential biases that should be noted when assessing this article's trustworthiness and reliability. For example, it does not provide any counterarguments or explore any alternative models that could be used for analysing piezoelectric structures. Additionally, it does not discuss any possible risks associated with using this model or present both sides equally when discussing its advantages over other models. Furthermore, there is no evidence provided for some of the claims made in the article which could make it difficult to verify their accuracy or validity.

# Topics for further research:

* Alternative models for piezoelectric analysis
* Potential risks associated with piezoelectric modelling
* Advantages and disadvantages of proposed model
* Evidence for claims made in article
* Linear and non-linear numerical examples
* 3D-material law for piezoelectric structures

# Report location:

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