# Non-linear buckling and large deflection analyses of isotropic and composite stiffened panels using an arbitrarily orientated stiffened element approach


by

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# Abstract

*A new approach for the non-linear buckling and large deflection analyses of isotropic and composite stiffened panels, as used in high speed craft, is presented.*

*Eight node isoparametric elements, formulated according to Marguerre shallow shell theory, are combined with three node beam elements, using the concept of equal displacements at the panel-stiffener interface, to represent the stiffened panels. Non-linear equilibrium equations are derived using the principle of virtual work applied to a continuum with a total Lagrangian description of motion.*

*The arbitrarily stiffened, shallow shell element is capable of modelling eccentric or concentric stiffeners attached to flat or imperfect panels under in-plane or transverse loads. Special modelling considerations for the loading and boundary conditions, required in the linear and non-linear buckling analyses of stiffened panels using arbitrarily stiffened finite elements, are suggested and discussed for the first time.*

*The Newton-Raphson incremental-iterative solution technique is used to obtain the non-linear response path. Results obtained in this investigation are compared with those available in the open literature to demonstrate the validity and efficiency of the proposed approach. Good agreement is found in all the investigated cases.*

*para mi querido Viejo...*

*"no hay que llegar primero, sino que hay que saber llegar..."*

*José Alfredo Jiménez*

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