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ON THE CHARACTERIZATION OF PARAMETRIC UNCERTAINTY ON FGM PLATES

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Summary: Composite materials with their intrinsic tailor-made capabilities can be strong candidates to improve the mechanical performance of structures, either by partially or totally replacing other traditional materials. These easily tailored features can be thought not only in terms of the more often used fibre reinforced laminated composites but also in the context of particulate composites. In general, the mechanical performance of composite structures can be, intentionally or not, influenced through the manipulation of geometric properties, the selection of material's phases and its disposition in the composite, as well as, the spatial distribution of reinforcement agents, such as fibres or particles. The uncertainty associated to all these different aspects can be considered as the main source of variability to the mechanical behaviour of a given structure. It is therefore important to characterize the relations between the geometric and material parameters and a set of some relevant structural responses. The quantification of uncertainty is often related to the experimental behaviour of a given structure, although it can also be assessed within the design perspective, where it is useful to understand and identify the parameters with a greater influence on the uncertainty associated to the model simulations. In the present work, one considers functionally graded plates, where different material and geometric characteristics are assumed to be uncertain. The mechanical behaviour of such plates is modelled using Lagrange-and Kriging-based finite element models, developed according to the assumptions of the first order shear deformation theory. A set of numerical results is presented and discussed in order to identify the most significant modelling parameters for the description of the output variability, in this case the maximum deflection.