

## DYNAMIC ANALYSIS OF MODERATELY THICK DOUBLY CURVED SHELLS VIA EFFICIENT 3D ELEMENTS

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The dynamic study of doubly curved shells is a subject of undoubted interest. Among them, there are a lot of shell structures with the shape of hyperbolic paraboloid, elliptic paraboloid or velaroidal shells; however, the dynamic analysis of this kind of structures is rather limited. Most studies refer to shallow and thin shells. In this work, following the theoretical approach of the problem, we perform the study of the vibrational frequencies of transverse oscillations of moderately thick shells by 3D elements. We formulate a close variant of the 20 nodes serendipity element and we apply it to the dynamic study of these kind of structures. We also discuss the different kinds of mass matrices, lumped and consistent mass matrices, proposing a variant of the classical lumped one.

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