

Mechanical Behavior of a Pipe Subject to Buckling

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Abstract : The thin shell structures like metal are particularly susceptible to buckling or geometric instability. Their sizing is performed by resorting to simplified rules, this approach is generally conservative. Indeed, these structures are very sensitive to the slightest imperfection shape (initial geometrical defects). The design is usually based on the knowledge of the real or perceived initial state. Now this configuration evolves over time, there is usually the addition of new deformities due to operation (accidental loads, creep), but also to loss of material located in the corroded areas. Taking into account these various damage generally led to a loss of bearing capacity. In order to preserve the charge potential of the structure, it is then necessary to find a different material. In our study, we plan to replace the material used for reservoirs found in the company Sonatrach with a composite material made from carbon fiber or glass. 6 to 12 layers of composite are simply stuck. Research is devoted to the study of the buckling of multilayer shells subjected to an imposed displacement, allowed us to identify the key parameters and those whose effect is less. For all results, we find that the carbon epoxy T700E is the strongest, increasing the number of layers increases the strength of the shell.

Keywords : finite element analysis, circular notches, buckling, tank made composite materials

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