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# A study on wrinkling characteristics and dynamic mechanical behavior of membrane

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**Abstract** An eigenvalue method considering the membrane vibration of wrinkling out-of-plane deformation is introduced, and the stress distributing rule in membrane wrinkled area is analyzed. A dynamic analytical model of rectangular shear wrinkled membrane and its numerical analysis approach are also developed. Results indicate that the stress in wrinkled area is not uniform, i.e. it is larger in wrinkling wave peaks along wrinkles and two ends of wrinkle in vertical direction. Vibration modes of wrinkled membrane are strongly correlated with the wrinkling configurations. The rigidity is larger due to the heavier stress in the part of wrinkling wave peaks. Therefore, wave peaks are always located at the node lines of vibration mode. The vibration frequency obviously increases with the vibration of wave peaks.

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