

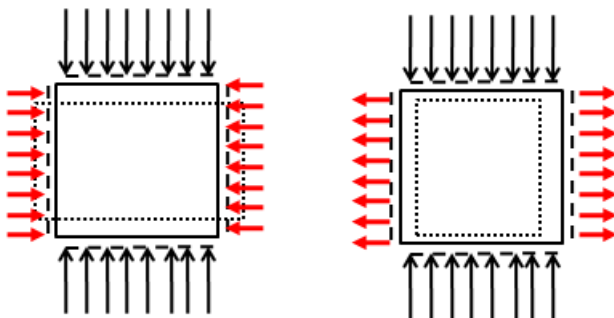
## BUCKLING BEHAVIOUR OF COMPRESSIVE PLATE WITH NEGATIVE POISSON'S RATIO MATERIALS

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The study of materials with negative Poisson's ratio has become a hot research topic because of their unique deformation mechanism and specific mechanical properties. Many beneficial effects emerge as a result of having a negative Poisson's ratio, including a higher resistance to indentation, improved acoustic properties and enhanced energy absorption. In this paper, the buckling behaviour of compressive plate with negative Poisson's ratio materials is discussed at different boundary conditions. Results show that the critical buckling loads of compressive plates can be obviously increased by reducing the Poisson's ratio of materials in some boundary conditions. As an example, sandwich panels with negative Poisson's ratio honeycomb core are utilized to realize the negative Poisson's ratio material, the detail microstructure parameters of sandwich panels are determined by inverse homogenization.



(a) positive Poisson's ratio (b) negative Poisson's ratio  
Fig.1 Deform schematic diagram of compressive plate

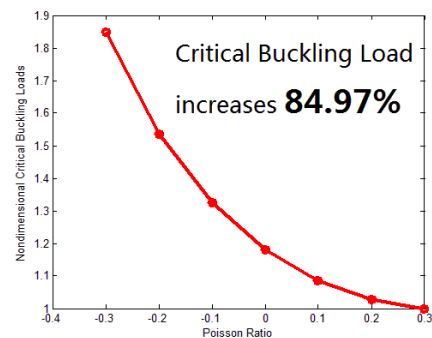


Fig.2 Critical buckling loads VS.  
Poisson's ratio

### REFERENCES

- [1] GN Greeves, AL Greer, RS Lakes, T Rouxel. Poisson's ratio and modern materials, *Nature Materials*. 10(2011)823-837
- [2] Y Prawoto. Seeing auxetic material from the mechanics point of view: A structural reviews on the negative Poisson's ratio, *computational Material science*. 58(2012)140-153