# Use of Bi-Stable Carbon Membranes in Morphing Constructions

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Bi-stable, double potential well carbon composites (cc) can be used as well as in outer space as on earth (as value of cc becomes profitable). In mechanical engineering kinematic pairs in which e.g. one detail slips in another components cavity, are commonly used. Use of metal alloy in kinematic pairs is problem owing to different circumstances that are provided in space for example: dry friction, vacuum, high temperature gradient that can cause details of mechanism to adhere due to diffusion. Carbon composites can take the place of kinematic pairs with backlash details using composites' two stable conditions. Importance of research „use of bi-stable carbon membranes in morphing constructions" is provided by bi stability of carbon plates as it changes condition if resonant frequency is established. Changing condition uncontrollably may cause fatal results that we seek to prevent. Firstly we investigated elastic force dependence on angle of deformation, afterwards, integrating given function we received potential energy dependence on angle where two potential wells were outlined. After that, investigated resonant frequency dependence on different parameters (geometrical, magnitude of mass and ….) of cc. Finally experimentally found motion of carbon membrane while changing position, by analyzing laser light beam motion attached to the membranes' moving vertex. Experiments were performed using PASCO software and sensors that provided us with 10 Hz data receiving frequency. As a product, using of this carbon composites, we made deploy able solar panel which can be used both place on earth and in space. This kind of research is a great support framework for various land or space based devices.

**Awards Won:**