## [Keynote Speaker]: Some Similarity Considerations for Design of Experiments for Hybrid Buoyant Aerial Vehicle

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**Abstract :** Buoyancy force applied on deformable symmetric bodies can be estimated by using Archimedes Principle. Such bodies like ellipsoidal bodies have high volume to surface ratio and are isometrically scaled for mass, length, area and volume to follow square cube law. For scaling up such bodies, it is worthwhile to find out the scaling relationship between the other physical quantities that represent thermodynamic, structural and inertial response etc. So, dimensionless similarities to find an allometric scale can be developed by using Bukingham π theorem which utilizes physical dimensions of important parameters. Base on this fact, physical dependencies of buoyancy system are reviewed to find the set of physical variables for deformable bodies of revolution filled with expandable gas like helium. Due to change in atmospheric conditions, this gas changes its volume and this change can effect the stability of elongated bodies on the ground as well as in te air. Special emphasis was given on the existing similarity parameters which can be used in the design of experiments of such bodies whose shape is affected by the external force like a drag, surface tension and kinetic loads acting on the surface. All these similarity criteria are based on non-dimensionalization, which also needs to be consider for scaling up such bodies.

Keywords : Bukhigham pi theorem, similitude, scaling, buoyancy

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