CREEP AND FATIGUE BEHAVIOR OF COMPOSITE STRUCTURES

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Abstract: Light weight fiber reinforced thermoplastic and thermoplastic composite materials are often under harsh environments for quite a prolonged period of time. Therefor creep and Fatigue behavior of composite structures should be understood and well taken care of in the early design stage. Modeling such behavior often requires a tremendous number of tests, which also often takes long time to cover wide range of environmental conditions such as high temperature. This presentation is to introduce the recent development of Multi-scale approach for creep rupture and fatigue life prediction with minimum efforts of tests. It starts with modeling of constituents-fiber, matrix and interface (micro scale); up-scaled to tow and laminate level (meso scale); and then applied to mechanical behavior of composite structures. This approach is successfully applied to prediction of long-term behavior of Thermoplastic Composites Pipes for flexible risers and innovative large-scaled wind blades.