

**UNIVERSITY OF TURKISH AERONAUTICAL ASSOCIATION
GRADUATE SCHOOL OF AERONAUTICS AND ASTRONAUTICS
AEROSPACE ENGINEERING PROGRAM**

GRADUATE SEMINAR SERIES

**MECHANICAL AND THERMAL ANALYSIS OF BIDIRECTIONAL GRAPHENE
REINFORCED COMPOSITE BEAM**

by

Syed Abdul Rafay Hammad

This seminar aims to present an in-depth exploration of the mechanical performance of composite beams reinforced with graphene platelets, considering varied distribution patterns along both the thickness and axial directions. The session will elucidate the mechanical and thermal properties of the beams, delving into the application of Euler deformation theory. The study involves a meticulous examination of rectangular graphene platelets using the Halpin Tsai model to determine the young modulus of the composite material. Attendees can anticipate a comprehensive exploration of the beams' bending, buckling, and vibrational behaviour. The thermal analysis, utilizing shear deformation theory and the Hamilton principle, will provide valuable insights into the mechanical response under thermal loading conditions. The investigation extends to the effects of diverse distribution patterns along the thickness direction, encompassing alterations in the distribution of graphene platelets along the axial direction. The solution methodology integrates the Fredholm Integral Method, with numerical analysis carried out using MATLAB. Following this, a comparative analysis will be conducted, contrasting the results with Finite Element Analysis (FEA) outcomes obtained through ANSYS. The seminar will conclude with a comparative discussion against existing literature, emphasizing the research's significance and highlighting the advantageous contributions of graphene platelets as a reinforcement material.

Date: January 23, 2024 Tuesday

Time: 15:30

Location: 102 Amfi