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Nota di contenuto	High Temperature Performance of Polymer Composites; Contents; Preface; Chapter 1 Introduction; 1.1 Background; 1.2 FRP Materials and Processing; 1.2.1 FRP Materials; 1.2.2 Processing Technologies; 1.3 FRP Structures; 1.3.1 Pontresina Bridge; 1.3.2 Eyecatcher Building; 1.3.3 Novartis Main Gate Building; 1.4 Structural Fire Safety; 1.4.1 Possible Fire Threats; 1.4.2 Building Fire Standards; 1.5 Summary; References; Chapter 2 Material States of FRP Composites under Elevated and High Temperatures; 2.1 Introduction; 2.2 Glass Transition; 2.2.1 Characterization; 2.2.2 Glass-Transition Temperature 2.2.3 Frequency Dependence of Glass-Transition Temperature 2.2.4 Heating Rate Dependence of Glass-Transition Temperature; 2.2.5 Modeling of Glass Transition; 2.3 Leathery-to-Rubbery Transition; 2.4 Decomposition; 2.4.1 Characterization; 2.4.2 Decomposition Temperature; 2.4.3 Modeling of Decomposition; 2.5 Summary; References; Chapter 3 Effective Properties of Material Mixtures; 3.1 Introduction; 3.2 Volume Fraction of Material State; 3.2.1 General Case

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3.3.1 In Cases of Two Material States 3.3.2 In Cases of Three Material States; 3.4 Estimated Effective Properties; 3.5 Summary; References;  
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4.4.1 Formulation of Basic Equations 4.4.2 Estimation of  $C_{p,b}$  and  $C_{p,a}$ ; 4.4.3 Decomposition Heat,  $C_d$ ; 4.4.4 Moisture Evaporation; 4.4.5 Comparison of Modeling and Experimental Results; 4.5 Time Dependence of Thermophysical Properties; 4.5.1 Introduction; 4.5.2 Influence of Heating Rates on Decomposition and Mass Transfer; 4.5.3 Influence on Effective Specific Heat Capacity; 4.5.4 Influence on Effective Thermal Conductivity; 4.6 Summary; References; Chapter 5 Thermomechanical Properties of FRP Composites; 5.1 Introduction; 5.2 Elastic and Shear Modulus; 5.2.1 Overview of Existing Models 5.2.2 Estimation of Kinetic Parameters 5.2.3 Modeling of E-Modulus; 5.2.4 Modeling of G-Modulus; 5.3 Effective Coefficient of Thermal Expansion; 5.4 Strength; 5.4.1 Shear Strength; 5.4.2 Tensile Strength; 5.4.3 Compressive Strength; 5.5 Summary; References; Chapter 6 Thermal Responses of FRP Composites; 6.1 Introduction; 6.2 Full-Scale Cellular Beam Experiments; 6.2.1 Material Details; 6.2.2 Specimen and Instrumentation; 6.2.3 Experimental Setup and Procedure; 6.2.4 Experimental Observation; 6.2.5 Thermal Response from Measurements; 6.2.6 Discussion  
6.3 Thermal Response Modeling of Beam Experiments

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Sommario/riassunto

The authors explain the changes in the thermophysical and thermomechanical properties of polymer composites under elevated temperatures and fire conditions. Using microscale physical and chemical concepts they allow researchers to find reliable solutions to their engineering needs on the macroscale. In a unique combination of experimental results and quantitative models, a framework is developed to realistically predict the behavior of a variety of polymeric materials over a wide range of thermal and mechanical loads. In addition, the authors treat worst-case scenarios, presenting heat-protect

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