REINFORCED AND POROUS MATERIALS
FOR STRUCTURAL APPLICATIONS

s and scientists are continuously trying to develop engineering materials
er physical and mechanical properties. In order to achieve this, a good
ntal knowledge particularly in materials science and mechanics of materials
d. Nevertheless, it is also well understood that it is less likely to develop a
vith improvement in every aspect of the properties. Therefore, it is essential
y the properties that are targeted to be improved based on the intended
on. In view of this, this book highlights some studies on the reinforced and
aterials for specific engineering applications. The aim is to provide some
s to the readers, such as engineers, researchers, academicians as well as
uate students to know the selection of design and testing parameters in
g advanced engineering materials.

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Preface

It is always a challenge for materials used in advanced engineering applications to exhibit excellent physical and mechanical properties. Therefore, research and development on materials with improved properties are always extensive and continuous. This relies on good fundamental knowledge particularly in mechanics of materials and materials science. In view of this, this edited book intends to collect some of the recent findings on the reinforced and porous materials used for specific engineering applications.

This book consists of ten chapters. It begins with some highlights on the design of composite laminates through fibre orientation and stacking sequence selections. Then, the studies of natural fibres in terms of flexural behaviour and acoustic performance are presented. Next, the potential of metal fibre as reinforcement for low velocity impact performance is reported. It is followed by the characterisation of particulates reinforcement on AA6061 alloy composites. After that, a brief review on conductive polypyrrole/polyurethane composites is summarised. Subsequently, the fire-retardancy, thermal stability, foam morphology, and compressive properties of nanosilica particles reinforced polyurethane foam are determined. Finally, the potential use of porous architecture for bone scaffold application is highlighted.

The contribution by all authors in this book, titled *Reinforced and Porous Materials for Engineering Applications*, is specifically acknowledged.

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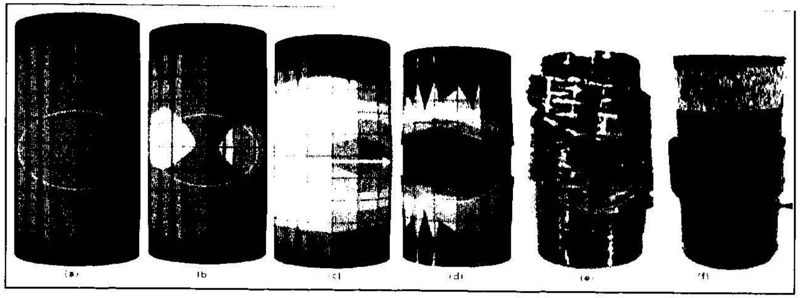

Figure 8.11 FRP confinement material failure (a) Load from TSPC core transferred to FRP confinement and increasing in FRP confinement material (b) FRP confinement material starts to soften (c) The lateral expansion occurs on FRP confinement (d) Failure occurs as sudden delamination (e) Sudden rupture and debonding failure mode on experimental GFRP confinement (f) Sudden delamination and debonding failure mode on experimental CFRP confinement

8.6 CONCLUSION

This study present numerical investigation on TSPC column with FRP material confinement under compression by FEM. The experimental and proposed FEM using ABAQUS commercial software package has shown similarity in strength enhancement with the application of GFRP and CFRP confinement on TSPC column through stress - strain curve produced. In addition to that, the failure observation from experimental and FEM simulation has also shown acceptable match with some deficiencies. The reason is that the exact value of compressive strength, yield strength and compressive modulus has shown some deviation between FEM and experimental. Although not precisely, the measured value of the parameters between FEM and experimental may be concluded as approximate match due to similar trend produced. FRP parameters is suggested to be improved to upgraded the FEM that has been developed.

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