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Special Issue "Advances in FRP Composites: Applications, Sensing, and Monitoring"

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A special issue of *Sensors* ([/journal/sensors](http://journal/sensors)) (ISSN 1424-8220). This special issue belongs to the section "[Physical Sensors \(/journal/sensors/sections/physicalsensors\)](http://journal/sensors/sections/physicalsensors)".

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Dr. Yun Lai Zhou

The Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong

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Interests: Structural Health Monitoring; Damage identification; Bridge Optimisation; Model updating; Fracture mechanics

Guest Editor

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Interests: finite element analysis; computational mechanics; numerical analysis; fretting fatigue; fretting wear; fatigue of materials

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Interests: Structural Engineering; Civil Engineering

Special Issue Information

Dear Colleagues,

Fiber reinforced polymer (FRP) composites have observed increasingly wide applications in civil engineering, mechanical engineering, aerospace engineering, and so on, owing to their advantages, such as high strength-to-weight and stiffness-to-weight ratios, in surpassing the limitations of conventional materials. FRP has been of core interest for scientists and engineers in designing and constructing new buildings, and in the maintenance of aged infrastructure, mechanical components, and so on. Although FRP has served in various fields, it lacks the full understanding of FRP in its whole service cycle. The degradation inspection and monitoring of FRP composite structures still requires further investigation, and the failure criterions as well, in particular for the complex structures integrated with FRP composite components.

This Special Issue aims to explore FRP composites via two perspectives: FRP composites applications, such as construction and sensing, inspection and monitoring, in particular, the recent advances in both industrial applications and sensing techniques for inspection and monitoring of FRP composites degradation. Rather than concentrating on the material level, this Special Issue focuses on the structural level and application field of FRP

composites, which shall include the applications of FRP composites in infrastructures, tall buildings, long span bridges, airplanes and so on. This Special Issue expects the investigations related to FRP composites from mechanical engineering, civil engineering, numerical studies, and so on.

This Special Issue expects to publish high-quality studies in terms of FRP composites applications and the sensing, inspection and monitoring, as well as reviews summarizing the advances in recent years. Original, high-quality contributions that are not published elsewhere are the target of this Special Issue.

- Potential topics include but are not limited to the following:
- Advances in sensing techniques for FRP composite structures
- Novel inspection methods for FRP composite structures
- Structural health monitoring for FRP composite structures
- Recent advances in designs, manufacture and applications of FRP
- Durability, fatigue performance of FRP composite structures
- Advanced sensing systems in FRP composites
- Embedded sensing system in FRP composites

Dr. Yun Lai Zhou

Dr. Magd Abdel Wahab

Dr. Francisco Javier Cañas Cara

Dr. Cheng Jiang

Guest Editors

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Keywords

- FRP
- Composite structures
- Structural health monitoring
- Damage identification
- Durability
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Research

Open Access Article

Flexural Capacity and Deflection of Fiber-Reinforced Lightweight Aggregate Concrete Beams Reinforced with GFRP Bars (/1424-8220/19/4/873)

by [Xi Liu \(/search?authors=Xi%20Liu&orcid=\)](#), [Yijia Sun \(/search?authors=Yijia%20Sun&orcid=\)](#) and [Tao Wu \(/search?authors=Tao%20Wu&orcid=\)](#)

Sensors **2019**, *19*(4), 873; <https://doi.org/10.3390/s19040873> (<https://doi.org/10.3390/s19040873>)

Received: 18 January 2019 / Revised: 31 January 2019 / Accepted: 13 February 2019 / Published: 20 February 2019

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Abstract Adding fibers is highly effective to enhance the deflection and ductility of fiber-reinforced polymer (FRP) -reinforced beams. In this study, the stress and strain conditions of FRP-reinforced lightweight aggregate concrete (LWC) beams with and without fibers at ultimate load level were specified. Based on [...] [Read more.](#)

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Improved Current Sensor for Water Diffusion Testing of Composite Insulators (/1424-8220/19/4/778)

by [Zhonghao Zhang \(/search?authors=Zhonghao%20Zhang&orcid=\)](#),

[Fanghui Yin \(/search?authors=Fanghui%20Yin&orcid=0000-0001-7267-6673\)](#),

[Liming Wang \(/search?authors=Liming%20Wang&orcid=0000-0002-4178-3537\)](#) and

[Hongwei Mei \(/search?authors=Hongwei%20Mei&orcid=0000-0002-7421-3186\)](#)

Sensors **2019**, *19*(4), 778; <https://doi.org/10.3390/s19040778> (<https://doi.org/10.3390/s19040778>)

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Abstract An improved current sensor aimed at measuring currents of different parts in composite insulator samples was proposed. Conventional current sensors used in water diffusion tests aim to examine the performance of composite insulators, however, it is difficult for the conventional current sensors to [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

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Axial Compression Behaviours of Pultruded GFRP–Wood Composite Columns (/1424-8220/19/4/755)

by [Yujun Qi \(/search?authors=Yujun%20Qi&orcid=0000-0003-4432-6275\)](#), [Lei Xie \(/search?authors=Lei%20Xie&orcid=\)](#), [Yu Bai \(/search?authors=Yu%20Bai&orcid=\)](#), [Weiqing Liu \(/search?authors=Weiqing%20Liu&orcid=\)](#) and [Hai Fang \(/search?authors=Hai%20Fang&orcid=\)](#) *Sensors* **2019**, *19*(4), 755; <https://doi.org/10.3390/s19040755> (<https://doi.org/10.3390/s19040755>)

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Abstract An innovative pultruded fiber reinforced polymer (FRP)–wood composite (PFWC) column with a lightweight southern pine wood core confined by outer FRP sheets was manufactured using an improved pultrusion process. Axial compression tests with both ends pinned as boundary conditions were employed to investigate [...] [Read more.](#)

(This article belongs to the Special Issue *Advances in FRP Composites: Applications, Sensing, and Monitoring (/journal/sensors/special_issues/FRP)*)

► Figures

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Open Access Article

Natural Fibre-Reinforced Polymer Composites (NFRP) Fabricated from Lignocellulosic Fibres for Future Sustainable Architectural Applications, Case Studies: Segmented-Shell Construction, Acoustic Panels, and Furniture (/1424-8220/19/3/738)

by [Hanaa Dahy \(/search?authors=Hanaa%20Dahy&orcid=0000-0003-3428-0074\)](#)

Sensors **2019**, *19*(3), 738; <https://doi.org/10.3390/s19030738> (<https://doi.org/10.3390/s19030738>)

Received: 6 January 2019 / Revised: 28 January 2019 / Accepted: 1 February 2019 / Published: 12 February 2019

[PDF Full-text \(/1424-8220/19/3/738/pdf\)](#) (8465 KB) | [HTML Full-text \(/1424-8220/19/3/738/htm\)](#) | [XML Full-text \(/1424-8220/19/3/738/xml\)](#)

Abstract Due to the high amounts of waste generated from the building industry field, it has become essential to search for renewable building materials to be applied in wider and more innovative methods in architecture. One of the materials with the highest potential in [...] [Read more.](#)

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► **Figures**

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Open Access Article

Performance Improvement of a Fiber-Reinforced Polymer Bar for a Reinforced Sea Sand and Seawater Concrete Beam in the Serviceability Limit State (/1424-8220/19/3/654)

by [Jiafei Jiang \(/search?authors=Jiafei%20Jiang&orcid=\)](#), [Jie Luo \(/search?authors=Jie%20Luo&orcid=\)](#), [Jiangtao Yu \(/search?authors=Jiangtao%20Yu&orcid=\)](#) and [Zhichen Wang \(/search?authors=Zhichen%20Wang&orcid=\)](#)

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[PDF Full-text \(/1424-8220/19/3/654/pdf\)](#) (5198 KB) | [HTML Full-text \(/1424-8220/19/3/654/htm\)](#) | [XML Full-text \(/1424-8220/19/3/654/xml\)](#)

Abstract Fiber-reinforced polymer (FRP) has supreme resistance to corrosion and can be designed with optic fibers. FRP can be an alternative to steel reinforcement for concrete structures, and can serve as a sensor for smart concrete structures. Due to poor cracking control and bond [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

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Open Access Article

Experimental Investigation on Interfacial Defect Criticality of FRP-Confined Concrete Columns (/1424-8220/19/3/468)

by [Renyuan Qin \(/search?authors=Renyuan%20Qin&orcid=\)](/search?authors=Renyuan%20Qin&orcid=),

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[Tiejun Liu \(/search?authors=Tiejun%20Liu&orcid=0000-0001-5028-1304\)](/search?authors=Tiejun%20Liu&orcid=0000-0001-5028-1304),

[Dujian Zou \(/search?authors=Dujian%20Zou&orcid=\)](/search?authors=Dujian%20Zou&orcid=) and

[Ao Zhou \(/search?authors=Ao%20Zhou&orcid=0000-0001-8884-909X\)](/search?authors=Ao%20Zhou&orcid=0000-0001-8884-909X)

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Abstract Defects between fiber reinforced polymer (FRP) and repaired concrete components may easily come out due to misoperation during manufacturing, environmental deterioration, or impact from external load during service life. The defects may cause a degraded structure performance and even the unexpected structural failure. [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](/journal/sensors/special_issues/FRP))

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Behaviour of Hybrid Steel and FRP-Reinforced Concrete—ECC Composite Columns under Reversed Cyclic Loading (/1424-8220/18/12/4231)

by [Fang Yuan \(/search?authors=Fang%20Yuan&orcid=\)](/search?authors=Fang%20Yuan&orcid=), [Liping Chen \(/search?authors=Liping%20Chen&orcid=\)](/search?authors=Liping%20Chen&orcid=),

[Mengcheng Chen \(/search?authors=Mengcheng%20Chen&orcid=\)](/search?authors=Mengcheng%20Chen&orcid=) and

[Kaicheng Xu \(/search?authors=Kaicheng%20Xu&orcid=\)](/search?authors=Kaicheng%20Xu&orcid=)

Sensors **2018**, *18*(12), 4231; <https://doi.org/10.3390/s18124231> (<https://doi.org/10.3390/s18124231>)

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[PDF Full-text \(/1424-8220/18/12/4231/pdf\)](/1424-8220/18/12/4231/pdf) (3303 KB) | [HTML Full-text \(/1424-8220/18/12/4231/html\)](/1424-8220/18/12/4231/html) | [XML Full-text \(/1424-8220/18/12/4231/xml\)](/1424-8220/18/12/4231/xml)

Abstract Fibre-reinforced polymer (FRP) is used widely in concrete structures owing to its noncorrosive, light-weight, nonmagnetic, and high tensile-strength properties. However, the FRP-reinforced concrete flexural member exhibits low ductility owing to the linear–elastic property of FRP reinforcement. Hybrid steel—FRP-reinforced concrete members exhibit good strength [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

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Open Access Article

Confined Concrete in Fiber-Reinforced Polymer Partially Wrapped Square Columns: Axial Compressive Behavior and Strain Distributions by a Particle Image Velocimetry Sensing Technique (/1424-8220/18/12/4118)

by [Yong-Chang Guo \(/search?authors=Yong-Chang%20Guo&orcid=\)](#),

[Shu-Hua Xiao \(/search?authors=Shu-Hua%20Xiao&orcid=\)](#),

[Jun-Wei Luo \(/search?authors=Jun-Wei%20Luo&orcid=\)](#), [Yu-Yi Ye \(/search?authors=Yu-Yi%20Ye&orcid=\)](#) and

[Jun-Jie Zeng \(/search?authors=Jun-Jie%20Zeng&orcid=0000-0003-0893-6623\)](#)

Sensors **2018**, *18*(12), 4118; <https://doi.org/10.3390/s18124118> (<https://doi.org/10.3390/s18124118>)

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Abstract Strengthening existing reinforced concrete (RC) columns using a partial wrapping strengthening technique (PWST) by fiber-reinforced polymer (FRP) strips has been widely implemented. However, compared with the confinement mechanism of confined concrete in columns strengthened with the FRP full wrapping strengthening technique (FWST), the [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

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Open Access Article

Effects of Aggregate Types on the Stress-Strain Behavior of Fiber Reinforced Polymer (FRP)-Confined Lightweight Concrete (/1424-8220/18/10/3525)

by Pengda Li ([/search?authors=Pengda%20Li&orcid=0000-0003-0933-7526](#)),

Lili Sui ([/search?authors=Lili%20Sui&orcid=](#)), Feng Xing ([/search?authors=Feng%20Xing&orcid=](#)),

Xiaoxu Huang ([/search?authors=Xiaoxu%20Huang&orcid=](#)),

Yingwu Zhou ([/search?authors=Yingwu%20Zhou&orcid=](#)) and

Yanchun Yun ([/search?authors=Yanchun%20Yun&orcid=](#))

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Abstract The realization of reducing concrete self-weight is mainly to replace ordinary aggregates with lightweight aggregates; such replacement usually comes with some intrinsic disadvantages in concrete, such as high brittleness and lower mechanical properties. However, these shortages can be effectively remedied by external confinement [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

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Open Access Article

Degradation of the In-plane Shear Modulus of Structural BFRP Laminates Due to High Temperature (/1424-8220/18/10/3361)

by [Yu-Jia Hu \(/search?authors=Yu-Jia%20Hu&orcid=\)](#),

[Cheng Jiang \(/search?authors=Cheng%20Jiang&orcid=0000-0003-4688-5812\)](#),

[Wei Liu \(/search?authors=Wei%20Liu&orcid=\)](#), [Qian-Qian Yu \(/search?authors=Qian-Qian%20Yu&orcid=\)](#) and

[Yun-Lai Zhou \(/search?authors=Yun-Lai%20Zhou&orcid=0000-0002-2347-647X\)](#)

Sensors **2018**, *18*(10), 3361; <https://doi.org/10.3390/s18103361> (<https://doi.org/10.3390/s18103361>)

Received: 23 August 2018 / Revised: 26 September 2018 / Accepted: 6 October 2018 / Published: 8 October 2018

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Abstract The behavior of fiber reinforced polymer (FRP) composites at high temperature is a critical issue that needs to be clearly understood for their structural uses in civil engineering. However, due to technical difficulties during testing at high temperature, limited experimental investigations have been [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

[\(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g001-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g001-550.jpg\)\)](#) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g002-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g002-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g003-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g003-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g004-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g004-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g005-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g005-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g006-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g006-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g007-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g007-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g008-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g008-550.jpg\)](#)) ([/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g009-550.jpg \(/sensors/sensors-18-03361/article_deploy/html/images/sensors-18-03361-g009-550.jpg\)](#))

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Open Access Article

Pulse Ultrasonic Cure Monitoring of the Pultrusion Process (/1424-8220/18/10/3332)

by [Patrick Scholle \(/search?authors=Patrick%20Scholle&orcid=0000-0003-4476-6983\)](#) and [Michael Sinapius \(/search?authors=Michael%20Sinapius&orcid=0000-0002-1873-9140\)](#)
Sensors **2018**, *18*(10), 3332; <https://doi.org/10.3390/s18103332> (<https://doi.org/10.3390/s18103332>)

Received: 23 August 2018 / Revised: 28 September 2018 / Accepted: 2 October 2018 / Published: 5 October 2018
 PDF Full-text ([/1424-8220/18/10/3332/pdf](#)) (888 KB) | HTML Full-text ([/1424-8220/18/10/3332/htm](#)) | XML Full-text ([/1424-8220/18/10/3332/xml](#))

Abstract This article discusses the results of a series of experiments on pulse ultrasonic cure monitoring of carbon fiber reinforced plastics applied to the pultrusion process. The aim of this study is to validate the hypothesis that pulse ultrasonic cure monitoring can be applied [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

[\(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g001-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g002-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g003-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g004-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g005-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g006-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g007-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g008-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g009-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g010-550.jpg \(/sensors/sensors-18-03332/article_deploy/html/images/sensors-18-03332-g011-550.jpg\)](#)

Open Access Article

Fatigue Performance of RC Beams Strengthened with CFRP under Overloads with a Ladder Spectrum (/1424-8220/18/10/3321)

by [Zhan-Biao Chen \(/search?authors=Zhan-Biao%20Chen&orcid=\)](#), [Pei-Yan Huang \(/search?authors=Pei-Yan%20Huang&orcid=\)](#), [Zheng-Wei Li \(/search?authors=Zheng-Wei%20Li&orcid=\)](#), [Xin-Yan Guo \(/search?authors=Xin-Yan%20Guo&orcid=\)](#), [Chen Zhao \(/search?authors=Chen%20Zhao&orcid=\)](#),

[Xiao-Hong Zheng \(/search?authors=Xiao-Hong%20Zheng&orcid=\)](#) and

[Yi Yang \(/search?authors=Yi%20Yang&orcid=0000-0003-4687-8014\)](#)

Sensors **2018**, *18*(10), 3321; <https://doi.org/10.3390/s18103321> (<https://doi.org/10.3390/s18103321>)

Received: 24 August 2018 / Revised: 26 September 2018 / Accepted: 30 September 2018 / Published: 3 October 2018

[PDF Full-text \(/1424-8220/18/10/3321/pdf\)](#) (3905 KB) | [HTML Full-text \(/1424-8220/18/10/3321/htm\)](#) | [XML Full-text \(/1424-8220/18/10/3321/xml\)](#)

Abstract Vehicle overload is detrimental to bridges and traffic safety. This paper presents a study on the fatigue performance of typical reinforced concrete (RC) beams of highway bridges under vehicle overload. A definition method of vehicle overload and a construction method of overload ladder [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

[\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g001-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g002-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g003-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g004-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g005-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g006-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g007-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g008-550.jpg\)](#) [\(/sensors/sensors-18-03321/article_deploy/html/images/sensors-18-03321-g009-550.jpg\)](#)

Open Access Article

Numerical Sensing of Plastic Hinge Regions in Concrete Beams with Hybrid (FRP and Steel) Bars (/1424-8220/18/10/3255)

by [Fang Yuan \(/search?authors=Fang%20Yuan&orcid=\)](#) and

[Mengcheng Chen \(/search?authors=Mengcheng%20Chen&orcid=\)](#)

Sensors **2018**, *18*(10), 3255; <https://doi.org/10.3390/s18103255> (<https://doi.org/10.3390/s18103255>)

Received: 4 September 2018 / Revised: 20 September 2018 / Accepted: 24 September 2018 / Published: 27 September 2018

[Cited by 2 \(/1424-8220/18/10/3255#citedby\)](#) | [PDF Full-text \(/1424-8220/18/10/3255/pdf\)](#) (3799 KB) | [HTML Full-text \(/1424-8220/18/10/3255/htm\)](#) | [XML Full-text \(/1424-8220/18/10/3255/xml\)](#)

Abstract Fibre-reinforced polymer (FRP)-reinforced concrete members exhibit low ductility due to the linear-elastic behaviour of FRP materials. Concrete members reinforced by hybrid FRP–steel bars can improve strength and ductility simultaneously. In this study, the plastic hinge problem of hybrid FRP–steel reinforced concrete beams was [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

[\(/sensors/sensors-18-03255/article_deploy/html/images/sensors-18-03255-g001-550.jpg\)](#) [\(/sensors/sensors-18-03255/article_deploy/html/images/sensors-18-03255-g002-550.jpg\)](#) [\(/sensors/sensors-18-](#)

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Open Access Article

AFRP Influence on Parallel Bamboo Strand Lumber Beams (/1424-8220/18/9/2854)

by [Huizhong Zhang \(/search?authors=Huizhong%20Zhang&orcid=\)](#),

[Haitao Li \(/search?authors=Haitao%20Li&orcid=\)](#), [Ileana Corbi \(/search?authors=Ileana%20Corbi&orcid=\)](#),

[Ottavia Corbi \(/search?authors=Ottavia%20Corbi&orcid=\)](#), [Gang Wu \(/search?authors=Gang%20Wu&orcid=\)](#),

[Chengjie Zhao \(/search?authors=Chengjie%20Zhao&orcid=\)](#) and

[Tongwei Cao \(/search?authors=Tongwei%20Cao&orcid=\)](#)

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Received: 4 August 2018 / Revised: 27 August 2018 / Accepted: 27 August 2018 / Published: 29 August 2018

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Abstract The mechanical properties of parallel bamboo strand lumber beams could be improved by aramid fiber reinforced polymer (AFRP). So far, no investigation has been conducted on the strengthening of engineering bamboo beams using AFRP. In order to study the efficiency of AFRP reinforcement [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

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Open Access Article

Application of FRP Bolts in Monitoring the Internal Force of the Rocks Surrounding a Mine-Shield Tunnel (/1424-8220/18/9/2763)

by [Zhen Liu \(/search?authors=Zhen%20Liu&orcid=0000-0003-0083-8754\)](#), [Cuiying Zhou \(/search?authors=Cuiying%20Zhou&orcid=\)](#), [Yiqi Lu \(/search?authors=Yiqi%20Lu&orcid=\)](#), [Xu Yang \(/search?authors=Xu%20Yang&orcid=\)](#), [Yanhao Liang \(/search?authors=Yanhao%20Liang&orcid=\)](#) and [Lihai Zhang \(/search?authors=Lihai%20Zhang&orcid=0000-0002-1282-992X\)](#)

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Cited by 1 ([/1424-8220/18/9/2763#citedby](#)) | [PDF Full-text \(/1424-8220/18/9/2763/pdf\)](#) (3561 KB) | [HTML Full-text \(/1424-8220/18/9/2763/htm\)](#) | [XML Full-text \(/1424-8220/18/9/2763/xml\)](#)

Abstract Monitoring the internal force of the rocks surrounding a mine-shield tunnel for the initial support of a mine-shield tunnel, in complex geological and hydrological environments, requires bolts with specific features such as high tensile strength, low shear strength, good insulation and resistance to [...] [Read more.](#)

(This article belongs to the Special Issue [Advances in FRP Composites: Applications, Sensing, and Monitoring \(/journal/sensors/special_issues/FRP\)](#))

► **Figures**

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Open Access Article

Theoretical and Numerical Study on Stress Intensity Factors for FRP-Strengthened Steel Plates with Double-Edged Cracks (/1424-8220/18/7/2356)

by [Hai-Tao Wang \(/search?authors=Hai-Tao%20Wang&orcid=\)](#),

[Gang Wu \(/search?authors=Gang%20Wu&orcid=\)](#) and [Yu-Yang Pang \(/search?authors=Yu-Yang%20Pang&orcid=\)](#)

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