

# Frontiers of Mechanical Engineering

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## Cover Story:

Fiber-reinforced composites are the preferred material in the fields of aviation and aerospace. The composite components are manufactured by near net-shape and only require finishing operations including milling and grinding to achieve final dimensional and assembly tolerances. Nevertheless, these materials are difficult-to-machine with laminated, anisotropic, and heterogeneous nature. As undesirable results and challenging breakthroughs, the surface damage and integrity is a research hotspot with essential engineering significance. This review summarizes an up-to-date progress of damage formation mechanisms and suppression strategies in milling and grinding for fiber-reinforced composites. First, the formation mechanisms of milling damage (delamination, burr, and tear) are analyzed. And, the grinding mechanisms, covering material removal mechanism, thermal mechanical behavior, surface integrity, and damage are discussed. Then, suppression strategies are reviewed systematically from the aspects of ultrasonic vibration-assisted machining, cryogenic cooling, minimum quantity lubrication, and tool optimization design. Finally, research gaps and future exploration directions are prospected, giving researchers opportunity to deepen specific aspects and explore new area for achieving high precision surface machining of fiber-reinforced composites.

Teng GAO, Yanbin ZHANG, Changhe LI, Yiqi WANG, Yun CHEN, Qinglong AN, Song ZHANG, Hao Nan LI, Huajun CAO, Hafiz Muhammad ALLI, Zongming ZHOU, Shubham SHARMA. *Front. Mech. Eng.*, 2022, 17(2): 24

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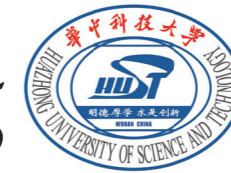
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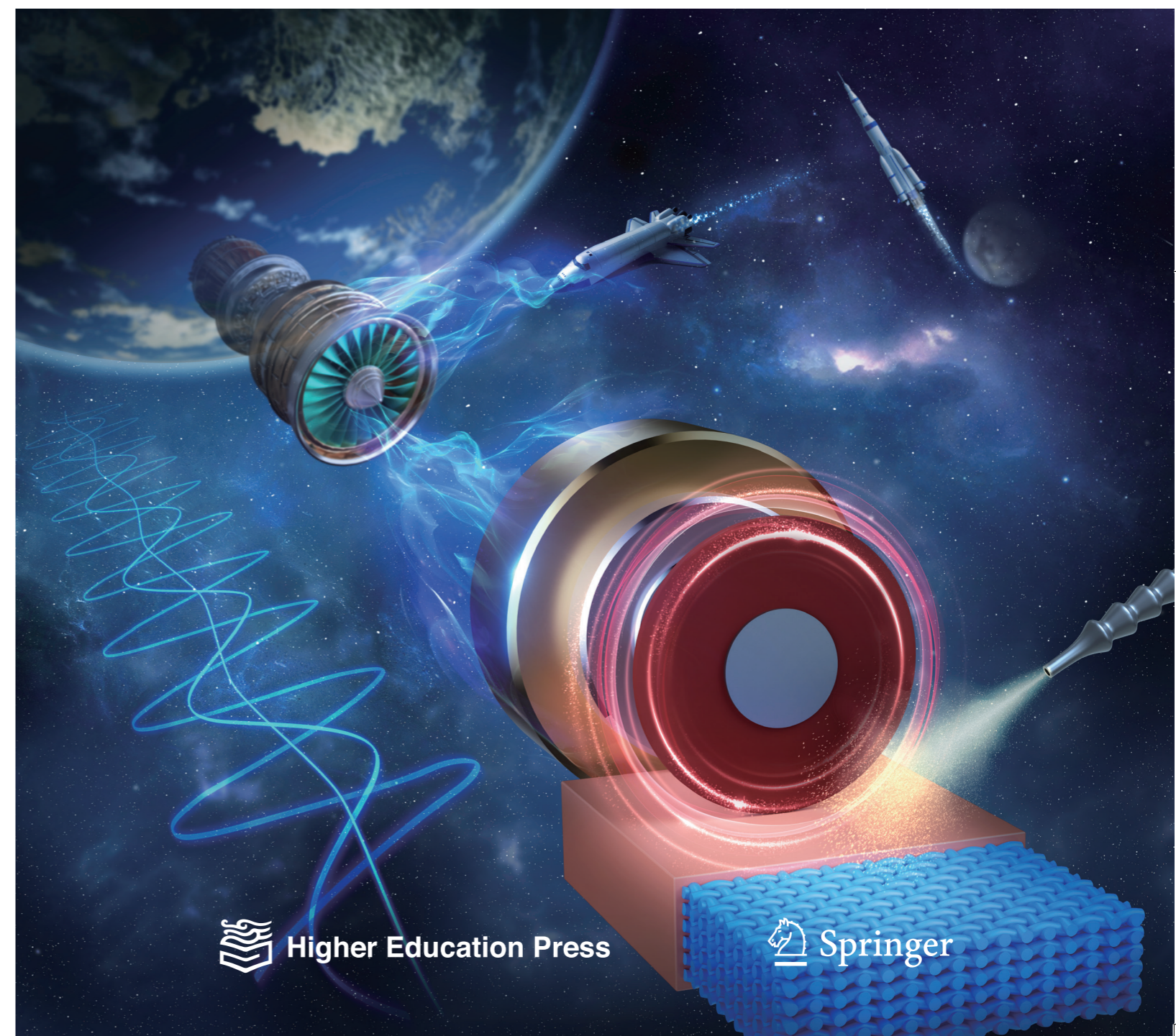
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