## Abstract

To address the engineering challenges of traditional fiber cement boards, such as high brittleness, significant early shrinkage and cracking, and low fiber reinforcement efficiency, and to improve the technical problems of PVA fibers easily aggregating and poor interface bonding in the cement matrix, this paper focuses on studying the influence of fiber addition methods on the macroscopic properties and microstructure of fiber cement boards. This paper uses the same type of PVA fibers to prepare fiber cement boards in the laboratory. During the fiber addition process, the fibers are either pre-dispersed or not pre-dispersed. By comparing and measuring indicators such as the three-point bending strength, dry density, wet density, water absorption rate, dry shrinkage rate, moisture movement and other indicators, the following experimental conclusions are drawn: The fiber cement boards prepared using the pre-dispersion method of fibers have a significantly better three-point bending strength within the range of 1.5-1.8% of fiber addition. After the fibers were pre-dispersed, the fiber addition amounts were 0%, 0.8%, 1.0%, 1.2%, 1.5%, 1.8%, 2.0%, and 2.2% respectively. The corresponding three-point bending strengths were 7.23MPa, 11.03MPa, 11.57MPa, 11.81MPa, 12.74MPa, 12.28MPa, 12.21MPa, 11.95MPa. When the fiber addition amount is 1.5%, the three-point bending strength of the fiber cement board reaches the maximum. This further indicates that pre-dispersing fibers can effectively improve the bending strength of fiber cement boards, and optimizing the addition method of PVA fibers is an effective way to enhance the mechanical properties and durability of fiber cement boards, providing important experimental data and theoretical support for the engineering preparation and process optimization of high-performance and high-stability fiber cement boards.