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Simulation of Fiber Deposition on Molded Fiber Screen Using Multi-Sphere Discrete Element Method

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Abstract : In line with the sustainable development goal, molded fiber products play important roles in reducing plastic-based packaging. To fabricate molded fiber products, besides using conventional meshing tools, 3D printing is employed to manufacture the molded fiber screen. 3D printing technique allows printing molded fiber screens with complex geometry, flexible in pore size and shape. The 3D printed molded fiber screens are in the progress of investigation to improve the de-watering efficiency, fiber collection, mechanical strength, etc. In addition, the fiber distribution on the screen is also necessary to access the quality of the screen. Besides using experimental methods to capture the fiber distribution on screen, simulation also offers using tools to access the uniformity of fiber. In this study, the fiber was simulated using the multi-sphere model to simulate the fibers. The interaction of the fibers was able to mimic by employing the discrete element method. The fiber distribution was captured and compared to the experiment. The simulation results were able to reveal the fiber deposition layer upon layer and explain the formation of uneven thickness on the tilted area of molded fiber screen.

Keywords : 3D printing, multi-jet fusion, molded fiber screen, discrete element method
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