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Microfiber coating for drag reduction in a cylinder flow[1] MITSUGU HASEGAWA, HIROTAKA SAKAUE, University of Notre Dame — A microfiber coating with a hair-like structure is studied as a passive drag reduction device for flow over a cylinder. The hair-like structure provides flexibility and permeability much like dense vegetation or a canopy. The microfiber coating controls the flow around the cylinder, which features both attached and separated flow. The impact of the microfiber coating on drag is experimentally investigated at a Reynolds number of 61000 based on the cylinder diameter. The configuration of the microfiber coatings is changed, including microfiber length and coating location. It is found that the microfiber length and location both play essential roles in drag reduction. The drag is reduced significantly if the microfiber coating is applied to areas of attached flow. There is moderate drag reduction if the microfiber coating is applied after the point of flow separation. The former requires relatively short fibers, where the length of the microfiber is less than 1.8% of the cylinder diameter. The latter is achieved using relatively long fibers, where the length of the microfiber is greater than 3.3% of the cylinder diameter.

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