

# **RADIATIVE PROPERTIES OF FIBERS WITH NON-CIRCULAR CROSS SECTIONAL SHAPES**

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**ABSTRACT.** The effects of cross sectional shape of non-circular fibers on the radiative properties, such as extinction and scattering efficiencies, are numerically investigated. A finite element method is developed to solve Maxwell's equations that govern a 2-dimensional electric field induced by a single fiber that is normally irradiated by a plane wave. The angular profile of the scattered radiation as well as the scattering and extinction efficiencies are derived from the electric fields. The radiative properties of fibers with equilateral triangular cross sectional areas are compared with those of circular fibers. The results show that the intensity distribution of the scattered radiation are scarcely affected by the cross sectional shape when the size parameter is less than 2, and that the efficiencies of the triangular shaped fibers are equivalent to those of the circular fibers having the same cross sectional area. This study also examines the radiative properties of fibers having silk-like cross sections that are thought to cause the luster of silk cloth. The results show that the fibers scatter the radiation more strongly toward the rear semicircle at a certain incident angle than the circular fibers having similar cross sectional areas.