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Design of a Polymer-Based Radial Thermoelectric Generator AKANKSHA MENON[1], SHANNON YEE[2], Georgia Institute of Technology — Polymers possess desirable properties such as low thermal conductivity, low cost, and scalable processability as compared to inorganic materials. These characteristics make polymers attractive for thermoelectric (TE) applications. Current examples of polymer thin-film TE devices are limited to traditional rectangular/parallel plate geometries. The focus of this work is to investigate the effect of radial device geometry on TE performance. Each TE module consists of many divided discs of p- and n-type polymers on a thermally insulating circular substrate. In the center of the disc a channel of warm fluid flows as the source of heat, which creates a radial temperature gradient across the TE. Many discs can be stacked and connected electrically in series, thus generating an appreciable output voltage. In this work, analytic thermal and electrical models are developed to present an optimized device geometry for maximum power, maximum efficiency, and low $/W scenarios. While the efficiency equation is identical to that for a rectangular geometry, the non-linear resistance of the radial device offers a higher power density and greater thermal insulation than traditional rectangular TEs.

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