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Current-Driven Instabilities and Coronal Heating STEVEN SPANGLER, University of Iowa — Radioastronomical observations of the solar corona have yielded measurements consistent with coronal currents $\simeq 2.5 \times 10^9$ Amperes inside an Amperian Loop with a width of about 35,000 km (Spangler, Astrophysical Journal, 670, 841, 2007). An estimate has been made of the coronal heating due to Joule heating by these currents. It is assumed that the current is concentrated in thin current sheets, as suggested by theories of MHD turbulence. If the Joule heating is to be astrophysically significant, the resistivity in the corona must be enhanced by about 6 orders of magnitude relative to the Spitzer value. In this paper, I explore the possibility that instabilities produced by these currents could be responsible for generating waves and turbulence which raise the resistivity to significant levels. Model-dependent calculations of the electron drift speed in the current sheets indicate that speeds of order the electron thermal speed are possible. Current-driven instabilities and their associated waves are therefore feasible. These drift speeds also exceed the ion acoustic speed, which would excite lower hybrid waves and enhance the resistivity.

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