1035-O1-1991   **David S Mazel** (`mazeld@gmail.com`), 962 WAYNE AVE, Silver Spring, MD 20910, and **Greg E Coxson*** (`gcoxson@tsc.com`), 962 Wayne Avenue, Suite 800, Silver Spring, MD 20910. *Billiards and signal processing.*

We connect billiards to time-series analysis with signal processing. Billiards create a variety of data types from periodic, say a point within some polygons, to the chaotic motion of trajectories within a Sinai billiard table. Billiards are easy to visualize, make a wonderful laboratory for studying chaos and for time series analysis based on their trajectory. These areas are ideal for introducing mathematics and signal processing to engineers to learn how to use computer tools and how to think about different areas of research.

We describe our implementation with MATLAB and our analysis of time-series data. We look for periodic behavior, and narrow and wide band signals within the frequency domain. We change data behavior by varying the billiard table shape or, by adding bumpers within the table. What's more, we present a genetic algorithm to control the trajectories under certain conditions. Finally, we discuss limitations such as numerical precision effects. (Received September 21, 2007)