1077-68-130 **Eric Rowland***, LaCIM, Universite du Quebec, Montreal, QC H2X 3Y7, Canada, and **Charles Brummitt**. *Growth of one-dimensional cellular automata.*

Cellular automata are simple machines consisting of cells that are updated in parallel at discrete time steps. We are interested in cells arranged in an infinite one-dimensional row. Given an initial configuration in which all but finitely many cells are in a constant "background" state, the *length* $\ell(t)$ of row t is the length of the region in row t that differs from the background.

We present the results of a combined automated–manual search for nonlinear growth sequences $\ell(t)$ in a space of 2^{16} cellular automaton rules. Significant new features found among these rules include fractal sets whose boundaries can be described by the fixed points of morphisms.

Many automata in this space have sequences $\ell(t)$ with characteristics of random walks. We attempt to classify these automata by their growth exponent $0 \leq \alpha \leq 1$, where $\ell(t) = \Theta(t^\alpha)$. However, we also show that this classification is not possible in general; indeed, we construct an automaton for which there are subsequences t_{i_n} and t_{j_n} such that $\ell(t_{i_n}) = \Theta(t_{i_n})$ but $\ell(t_{j_n}) = \Theta(\sqrt{t_{j_n}})$. (Received July 28, 2011)