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Pattern Theorems for Self-Avoiding Polygons in $\mathbb{Z}^2$ and $\mathbb{Z}^3$.

A useful mathematical tool for studying the asymptotics of the number of n-edge self-avoiding polygons in the hypercubic lattice, $\mathbb{Z}^d$, is a "pattern theorem". Madras (1999 *Ann. Comb.* **3** 357-84) developed a general pattern theorem for sets of lattice clusters satisfying a set of axioms. For such a set of size n clusters (C_n) and a weight function (wt), the focus is on the generating function $\mathcal{G}_n = \sum_{G \in C_n} wt(G)$. The pattern theorem deals with the *growth rate* $\lambda = \limsup_{n\to\infty} (\mathcal{G}_n)^{1/n}$. Specifically it states that for a pattern P: there exists an $\epsilon > 0$ such that the growth rate for the generating function of size n clusters which contain less than ϵn translates of P is strictly less than λ.

Based on Madras' pattern theorem, James and Soteros (2007 *JPhysA* **40** 8621-34) proved a pattern theorem for self-avoiding polygons in $\mathbb{Z}^2$. This will be reviewed along with some applications to lattice models of interacting ring polymers. Some recent applications of pattern theorems to the study of entanglements in self-avoiding polygons confined to tubular sublattices of $\mathbb{Z}^3$ will also be discussed. (Received August 12, 2008)