1041-82-187 **Paul Federbush*** (pfed@umich.edu), Department of Mathematics, University of Michigan, Ann Arbor, MI 48103. *Asymptotic Expansion for Dimer Lambda$_d$.*

The dimer problem arose in a thermodynamic study of diatomic molecules and was abstracted into one of the most basic and natural problems in both statistical mechanics and combinatorial mathematics. One generalizes the problem of finding how many ways one may cover a chess board with dominos (dimers), with no overlapping dimers, each dimer covering two neighboring squares. In d dimensions dimers have d orientations, and still may cover two neighboring boxes. On a periodic cubic volume with even edge size the number of ways of covering by dimers is known to be of the form $exp(\lambda_d V)$ as V the volume goes to infinity. For many years it has been known that as d goes to infinity

λ_d $(1/2)ln(2d) - 1/2$

We have developed a formalism leading to a full asymptotic expansion

λ_d $(1/2)ln(2d) - 1/2 + c_1/d + c_2/d^2...$

We have found $c_1 = 1/8, c_2 = 5/96, c_3 = 5/64, c_1$ and c_2 were first calculated by hand, and all three c's computed by computer. They are complex enough that I believe unless another formulation is found for the asymptotic expansion the $1/d^4$ term will never be computed! There's a challenge. There is still much work required to make the expansion mathematically rigorous. (Received August 11, 2008)