

Combinatorial Problems Raised by Statistical Mechanics  
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# Negative correlations for trees, forests, and Potts model

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## **Abstract**

The Rayleigh monotonicity property of linear resistive electrical networks can be regarded as a set of inequalities applied to the generating polynomial for spanning trees of a graph. This can be generalized in several directions, by considering more general matroids, or more informative polynomials. Particularly interesting at the moment is a conjecture of Grimmett and Winkler that the Rayleigh condition should hold for spanning forests of any graph. I'll show how to reduce the even stronger Potts–Rayleigh condition to the case of 3-connected graphs (or matroids), thereby showing that all series-parallel graphs are Potts–Rayleigh (and thus forest-Rayleigh). This is conjectured to have implications for the enumeration of forests in graphs.