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# On the Potts model partition function in an external field

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We study the partition function of Potts model in an external (magnetic) field, and its connections with the zero-field Potts model partition function. Using a deletion-contraction formulation for the partition function  $Z$  for this model, we show that it can be expanded in terms of the zero-field partition function. We also show that  $Z$  can be written as a sum over the spanning trees, and the spanning forests, of a graph  $G$ . Our results extend to  $Z$  the well-known spanning tree expansion for the zero-field partition function that arises through its connections with the Tutte polynomial.

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