Hidden temperature in the KMP model

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In the KMP model there is a nonnegative real value associated with each site $i = 1, \dots, n$. When a Poisson clock rings at the bond ij with values X_i, X_j, those values are substituted by $U(X_i+X_j)$ and $(1-U)(X_i+X_j)$, respectively, where U is a uniform random variable in $(0, 1)$. We show that the invariant measure for this process in an interval with boundary conditions T_0, T_{n+1} is the distribution of a vector $(T_i X_i)$, where $\underline{X}$ are iid exponential(1) random variables, the law of $\underline{T}$ is the invariant measure for an opinion model with the same boundary conditions, and $\underline{X}, \underline{T}$ are independent. The proof builds on a coupling between a homogeneous KMP model $\underline{X}(t)$ and an opinion model $\underline{T}(t)$, whose product $\underline{\zeta}_t$, $\zeta_i(t) := X_i(t)T_i(t)$, behaves like the non homogeneous KMP. The result confirms a conjecture based on the large deviations of the model. The approach is used to performs the hydrodynamics. The discrete derivative of the opinion model behaves as a neural spiking process, which is also analysed.