COMMENTS

Comments are short papers which criticize or correct papers of other authors previously published in the **Physical Review**. *Each Comment should state clearly to which paper it refers and must be accompanied by a brief abstract. The same publication schedule as for regular articles is followed, and page proofs are sent to authors.*

Comment on "Solutions of the telegrapher's equation in the presence of traps"

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This comment corrects an explanation, given in a recent and interesting paper by Masoliver, Porra, and Weiss [Phys. Rev. A **45**, 2222 (1992)], to account for one of the discontinuities of the probability density of the telegrapher process in the presence of a trap. The discontinuity is due to the trapping of the random walkers that would have undergone one reversal if there were no trap, instead of "reflections from the trapping point, i.e., from particles which reach the trap but reverse direction when they reach that point", quoting from the authors.

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This Comment corrects an explanation, given in a recent and interesting paper by Masoliver, Porra, and Weiss [1], to account for one of the discontinuities of the probability density of the telegrapher process in the presence of a trap. The discontinuity is due to the trapping of the random walkers that would have undergone one reversal if there were no trap, instead of "reflections from the trapping point, i.e., from particles which reach the trap but reverse direction when they reach that point", quoting from the authors.

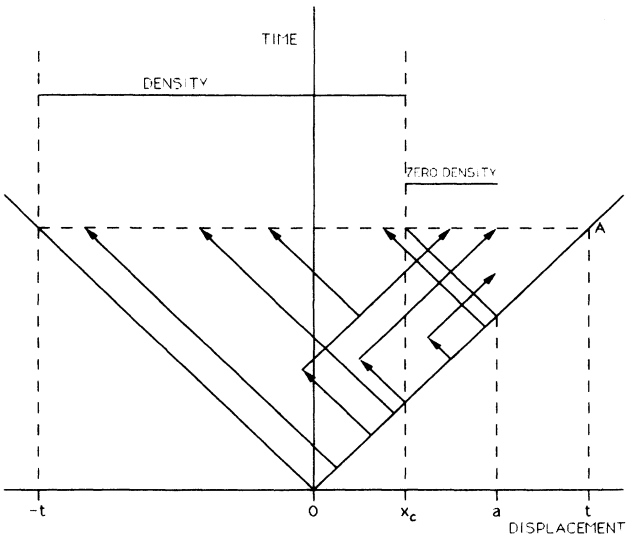

FIG. 1. Space-time diagram for the random walk.

Instead of following the approach of Ref. [1], namely, via partial-differential equations, we shall look at the random walk in more direct probabilistic terms. For the purpose of clarifying the present claim, it is helpful to look at the space-time diagram for the random walk, Fig. 1, where some sample paths are shown, even though the claim can be read directly from the results obtained in Ref. [2]. First assume that there is no trap, and let the speed be unity. Consider those particles that started out moving right and have reversed direction once only by time t. Because for the telegrapher process we may write the probability of reversing direction in the time interval dt as $\lambda\, dt$ where the rate λ is assumed to be constant, it is equally likely for the walker to reverse direction at each dt about each point along the line OA in Fig. 1. We can also establish that each path is equally likely [with probability $\lambda \exp(-\lambda t) dt$], that is, the probability density for the position of the random walker at time t is uniform between (-t,t]. Now introduce a trap at $x = a$; then only those particles which have reversed direction before hitting the trap will contribute to the density, leaving us with a discontinuous density which drops to zero from the point $x_c = 2a - t$ on. Alternatively, we can adopt the view that the contribution from those particles which reverse direction between time a and t has to be subtracted from the density for the case without the trap.

In the other cases of interest (those that started out moving right and have reversed direction more than once,

and those that started out moving left and have reversed direction at least once by time t), this kind of discontinuity is absent since the particles can go into the region between x_c and a in a continuous manner.

One of us (S.K.F.) wishes to thank Dr. G. Weiss for bringing Ref. [1] to his attention, and for the helpful remark on this Comment that prompted the addition of the opening sentence in the second paragraph.

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[1] J. Masoliver, J. M. Porra, and G. H. Weiss, Phys. Rev. A **45**, 2222 (1992).

[2] S. K. Foong and S. Kanno (unpublished).