Fernandez and Reinisch Respond: In the Comment,[1] there are, to our point of view, on one hand a main inaccuracy and on the other hand the account of an interesting result. The inaccuracy concerns the passage: "the results are supported.... Both are correct." As a matter of fact, both are *not* correct, at least inasmuch as we focus on the conclusion of Fogel *et al.*[2,3] and ours.[4,5] Indeed, both of these above-quoted perturbation treatments start with the same object, i.e., "a soliton initially at rest in the frame moving with velocity v and perturbation turned on at time $t=0$" (quotation from Fogel *et al.*), assume the same short time scale (as is also done in all other perturbation theories—Refs. 2, 3, 6, and 7), and use the same formalism—and lead to opposite conclusions. In Refs. 4 and 5 we pointed out the mathematical reason for this discrepancy, explained its physical meaning, and numerically checked our results.

We recall that the non-Newtonian behavior, at short times, of an accelerated sine-Gordon kink was found in Refs. 4 and 5 to be due to the dynamical interaction between the so-called Goldstone (translation) mode and the continuum (phonon) spectrum which both build the response of the sine-Gordon kink to the (weak) perturbation. Therefore, when we read in the Comment that "the vacuum motion through du_∞/dt influences the motion of the soliton," we feel that this sentence is merely a vulgarizing translation of the above interaction effect, and, or course, we do agree with it.

On the other hand, when one changes the initial condition of the weakly perturbed sine-Gordon problem as suggested in the Comment (i.e., if one does not start from a pure soliton solution as in Refs. 2, 3, 6, and 7), one may indeed obtain a Newtonian object, and this result is new, to our knowledge. The reason for this Newtonian behavior is that this particular initial condition precisely destroys the interaction effect between the Goldstone mode and the continuum spectrum —this may be exactly shown by using the same formalism as in Ref. 5. (Details are given in a forthcoming paper.[8]) In Olsen and Samuelsen's words, it destroys the action of the force term on the vacuum. Olsen and Samuelsen cleverly noted that this particular choice of the initial condition corresponds to a "ground state" of the system, considered from an energetic point of view. But the question then remains open to know whether this Cauchy problem may still be considered as a weak perturbation of a sine-Gordon *soliton* solution, since the solution at $t=0$ is *not* a soliton.

Anyway, this "ground-state" effect is remarkable, from a theoretical point of view, and since any experimental device concerning long Josephson transmission lines includes characteristic damping times which force the vacuum to "fall" into its ground state long before the bias term becomes efficient, it is clear that this effect is dominant in many physical situations of practical interest.

We conclude by noting that carrying on a controversy about the Newtonian character of the sine-Gordon soliton would be rather fruitless since the debate now clearly deals with a question of definition of the physical object we perturb by the weak constant force. Having worked on the papers (Refs. 2 and 3) which initiated this aspect of the dynamical study of the sine-Gordon kink, we naturally adopted their definition of a Newtonian kink behavior (related to the choice of a pure kink as an initial condition), and we found through a careful mathematical analysis that a sine-Gordon soliton did not obey this definition. It is of course possible to *decide*—and there are several physical reasons for doing so, as indicated above—that what we have to look at, at $t=0$, is no more a pure sine-Gordon soliton, but a solitary wave obtained by the addition of $\sin^{-1}\chi$ to the kink profile. This new object then appears Newtonian, as indicated by Olsen and Samuelsen. But the problem has been changed.

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