Kaplan Responds: In my paper,[1] commented on by Enns and Rangnekar,[2] the existence of bistable solitons was analytically predicted in a highly nonlinear Schrödinger equation for a certain class of nonlinearities. The computer simulation done by Enns and Rangnekar[2] shows that for some particular model of nonlinearity [see Eq. (10) in my paper[1]], the bistable soliton with $d\delta/dP > 0$ is stable whereas the bistable soliton with $d\delta/dP < 0$ is unstable when the two of them collide in a nonlinear medium. As they emphasize, this result supports the hypothetical criterion of stability of these solitons suggested in my paper[1] on which I agree with them. I believe, in fact, that the implication of the simulation[2] goes even further in that it suggests that the soliton with $d\delta/dP > 0$ (for that particular model of nonlinearity) is stable not only against small perturbation as implied in my paper[1] (see also Kaplan[3]), but also against such a large perturbation as another soliton. This is a very significant and exciting result. The next point of interest obviously is the collision of two bistable solitons (which carry the same total power) in a medium with such a nonlinearity that for *both* of them $d\delta/dP > 0$ [this will require consideration of other models of nonlinearity; see, for example, Eq. (13) and Fig. 1, curve 3 in my paper[1]]. If such solitons (at least for some models of nonlinearity) survive the collison with their respective powers and momenta unchanged, it will be a clear indication that the bistable solitons are indeed physically realizable. This will be important both for the theory of nonlinear propagation and for applications such as, for example, excitation of bistable soliton pulses in nonlinear optical fibers for communication purposes.

One of the comments by Enns and Rangnekar regarding β_{cr} caused me to recheck the formula for $P(\delta)$, Eq. (11) in my paper,[1] related to the particular model of nonlinearity, Eq. (10), used by them. Equation (11) contains an insignificant error: The term "$\arccos\sqrt{\beta}$," should read "$\arccos(-\sqrt{\beta})$," in agreement with the expression used by Enns and Rangnekar.[2] This does not affect the nature of the conclusions based on that equation and has no implication to the rest of my paper. The critical parameters P_{cr} and δ_{cr} (or β_{cr}) for that particular model of nonlinearity must be revised, though, as a result of this correction: The top line of the right column on p. 1293 of my paper,[1] instead of "... $P_{cr2} \approx 4.28 I_0/\Delta^{1/2}$ with $\beta(P_{cr}) \approx 0.26$," should read now "... $P_{cr2} \approx 5.549 I_0/\Delta^{1/2}$ with $\beta(P_{cr}) \approx 0.153\,38$." This new critical constant $\beta(P_{cr})$ is in a good agreement with $\beta_{cr} \approx 0.15$ found in the computer simulation.[2]

I am most grateful to R. H. Enns and S. S. Rangnekar for their supportive and helpful comments. This work is supported by the U. S. Air Force Office of Scientific Research.

A. E. Kaplan
School of Electrical Engineering
Purdue University
West Lafayette, Indiana 47907

Received 11 April 1986
PACS numbers: 42.65.Bp, 03.40.Kf, 42.50.Qg, 42.65.Pc

[1] A. E. Kaplan, Phys. Rev. Lett. **55**, 1291 (1985).

[2] R. H. Enns and S. S. Rangnekar, preceding Comment [Phys. Rev. Lett., **57**, 778 (1986).

[3] A. E. Kaplan, IEEE J. Quantum Electron. **21**, 1544 (1985).

© 1986 The American Physical Society