LETTERS TO THE EDITOR

This Letters section is for publishing (a) brief acoustical research or applied acoustical reports, and (b) comments on articles or letters previously published in this Journal. Extensive reports should be submitted as articles, not in a letter series. Letters are peer-reviewed on the same basis as articles, but usually require less review time before acceptance. Letters cannot exceed four printed pages (approximately 3000–4000 words) including figures, tables, references, and a required abstract of about 100 words.

Comment on "Time domain Doppler estimators of the amplitude of vibrating targets" [J. Acoust. Soc. Am. 91, 965–974 (1992)]

Jean C. Piquette and A. L. Van Buren

Naval Research Laboratory, Underwater Sound Reference Detachment, P. O. Box 568337, Orlando, Florida 32856-8337

(Received 3 April 1992; accepted for publication 25 September 1992)

It is pointed out that the subject paper is valid only in an extremely limited regime, due to the influences of medium nonlinearities.

PACS numbers: 43.25.Cb, 43.60.Gk, 43.80.Vj

We have previously pointed out[1–3] that using linear Doppler effect analysis to evaluate scattering by a vibrating surface produces inaccurate results in acoustics, except under highly specialized conditions.[4] Our objections are based on the fact that medium nonlinearities, and nonlinearities in the fundamental acoustical equations, produce much stronger effects than those predicted on the basis of linear acoustical theory. In the subject paper,[5] it is suggested that our objections do not apply to the case considered because, "...for the simplified case of a sinusoidally vibrating target, the returned signal can be represented by a pure-tone frequency modulation (FM) process." (See the last sentence beginning on p. 965 of Ref. 5.) However, the cases we have studied[1–4] have, in fact, involved sinusoidally vibrating surfaces. (For example, the simple case of the scattering of a normally incident sinusoidal plane wave from a sinusoidally vibrating planar surface was considered in Ref. 3.) Thus, our objections do, in fact, apply to Ref. 5.

An earlier paper by the same authors[6] correctly restricts the method of linear Doppler effect analysis to cases in which the wavelength of the scattered waves is much larger than the geometrical dimensions of the scatterer, a condition which was described earlier by us.[4] Thus we have no objections to Ref. 6. However, it should not be thought that the results of Ref. 5 are less restricted because of the simple sinusoidal surface vibrations that are considered. The results of Ref. 5 must be restricted in the same way, and for the same reasons, as those of Ref. 6.

[1] J. C. Piquette and A. L. Van Buren, "Nonlinear scattering of acoustic waves by vibrating surfaces," J. Acoust. Soc. Am. **76**, 880–889 (1984).

[2] J. C. Piquette and A. L. Van Buren, "Comments on 'Harmonic and transient scattering by time varying obstacles [J. Acoust. Soc. Am. **76**, 1527–1534 (1984)],'" J. Acoust. Soc. Am. **79**, 179–180 (1986).

[3] J. C. Piquette and A. L. Van Buren, "Some further remarks regarding scattering of an acoustic wave by a vibrating surface," J. Acoust. Soc. Am. **80**, 1533–1536 (1986).

[4] J. C. Piquette, A. L. Van Buren, and P. H. Rogers, "Censor's acoustical Doppler effect analysis—Is it a valid method?," J. Acoust. Soc. Am. **83**, 1681–1682 (1988).

[5] S. Huang, R. M. Lerner, and K. J. Parker, "Time domain Doppler estimators of the amplitude of vibrating targets," J. Acoust. Soc. Am. **91**, 965–974 (1992).

[6] S. Huang, R. M. Lerner, and K. J. Parker, "On estimating the amplitude of harmonic vibration from the Doppler spectrum of reflected signals," J. Acoust. Soc. Am. **88**, 2702–2712 (1990).

LETTERS TO THE EDITOR

This Letters section is for publishing (a) brief acoustical research or applied acoustical reports, and (b) comments on articles or letters previously published in this Journal. Extensive reports should be submitted as articles, not in a letter series. Letters are peer-reviewed on the same basis as articles, but usually require less review time before acceptance. Letters cannot exceed four printed pages (approximately 3000–4000 words) including figures, tables, references, and a required abstract of about 100 words.

Comment on "Time domain Doppler estimators of the amplitude of vibrating targets" [J. Acoust. Soc. Am. 91, 965–974 (1992)]

Jean C. Piquette and A. L. Van Buren
Naval Research Laboratory, Underwater Sound Reference Detachment, P. O. Box 568337, Orlando, Florida 32856-8337

(Received 3 April 1992; accepted for publication 25 September 1992)

It is pointed out that the subject paper is valid only in an extremely limited regime, due to the influences of medium nonlinearities.

PACS numbers: 43.25.Cb, 43.60.Gk, 43.80.Vj

We have previously pointed out[1–3] that using linear Doppler effect analysis to evaluate scattering by a vibrating surface produces inaccurate results in acoustics, except under highly specialized conditions.[4] Our objections are based on the fact that medium nonlinearities, and nonlinearities in the fundamental acoustical equations, produce much stronger effects than those predicted on the basis of linear acoustical theory. In the subject paper,[5] it is suggested that our objections do not apply to the case considered because, "...for the simplified case of a sinusoidally vibrating target, the returned signal can be represented by a pure-tone frequency modulation (FM) process." (See the last sentence beginning on p. 965 of Ref. 5.) However, the cases we have studied[1–4] have, in fact, involved sinusoidally vibrating surfaces. (For example, the simple case of the scattering of a normally incident sinusoidal plane wave from a sinusoidally vibrating planar surface was considered in Ref. 3.) Thus, our objections do, in fact, apply to Ref. 5.

An earlier paper by the same authors[6] correctly restricts the method of linear Doppler effect analysis to cases in which the wavelength of the scattered waves is much larger than the geometrical dimensions of the scatterer, a condition which was described earlier by us.[4] Thus we have no objections to Ref. 6. However, it should not be thought that the results of Ref. 5 are less restricted because of the simple sinusoidal surface vibrations that are considered. The results of Ref. 5 must be restricted in the same way, and for the same reasons, as those of Ref. 6.

[1] J. C. Piquette and A. L. Van Buren, "Nonlinear scattering of acoustic waves by vibrating surfaces," J. Acoust. Soc. Am. **76**, 880–889 (1984).
[2] J. C. Piquette and A. L. Van Buren, "Comments on 'Harmonic and transient scattering by time varying obstacles [J. Acoust. Soc. Am. **76**, 1527–1534 (1984)],'" J. Acoust. Soc. Am. **79**, 179–180 (1986).
[3] J. C. Piquette and A. L. Van Buren, "Some further remarks regarding scattering of an acoustic wave by a vibrating surface," J. Acoust. Soc. Am. **80**, 1533–1536 (1986).
[4] J. C. Piquette, A. L. Van Buren, and P. H. Rogers, "Censor's acoustical Doppler effect analysis—Is it a valid method?," J. Acoust. Soc. Am. **83**, 1681–1682 (1988).
[5] S. Huang, R. M. Lerner, and K. J. Parker, "Time domain Doppler estimators of the amplitude of vibrating targets," J. Acoust. Soc. Am. **91**, 965–974 (1992).
[6] S. Huang, R. M. Lerner, and K. J. Parker, "On estimating the amplitude of harmonic vibration from the Doppler spectrum of reflected signals," J. Acoust. Soc. Am. **88**, 2702–2712 (1990).

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	January 1993	FINAL

4. TITLE AND SUBTITLE
Comment on "Time domain Doppler estimators of the amplitude of vibrating targets" [J. Acoust. Soc. Am. 91, 965-974 (1992)]

5. FUNDING NUMBERS
PE - 61153N
TA - RR011-08-42
WU - DN220-161

6. AUTHOR(S)
Jean C. Piquette and A.L. Van Buren

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
NAVAL RESEARCH LABORATORY
UNDERWATER SOUND REFERENCE DETACHMENT
P.O. BOX 568337
ORLANDO, FL 32856-8337

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
OFFICE OF NAVAL RESEARCH
800 N. QUINCY STREET
ARLINGTON, VA 22217-5000

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

It is pointed out that the subject paper is valid only in an extremely limited regime, due to the influences of medium nonlinearities.

14. SUBJECT TERMS
Doppler Effect
Doppler scattering
Nonlinear Acoustics
Scattering by vibrating surfaces
Nonlinear scattering

15. NUMBER OF PAGES
1

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCALSSIFIED	UL