LETTER TO THE EDITOR

Comments on a paper by H. Unz, "On the origin of 'very low frequency emissions'"

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In a recent paper, Unz (1962a) has attempted to explain the origin of very-low-frequency emissions. As has been pointed out, (Epstein, 1962; Bell *et al.*, 1962) the formula on which his work is based (Unz, 1962b), is incorrectly derived. His formula gives approximately the phase velocity as observed in the fixed frame of reference in terms of the doppler-shifted frequency observed in the frame of reference in which the particle stream is stationary. In applying the formula, Unz used the frequency seen in the fixed frame of reference. Solving for the doppler-shifted frequency in terms of the frequency in the fixed frame yields a cubic equation. The doppler shift depends on the stream velocity relative to the phase velocity of the wave. Since the latter is, in general, small for the whistler case, values of β (ratio of stream velocity to velocity of light) much less than unity can give appreciable doppler shifts. Since Unz must postulate two moving streams with different stream velocities, then for a given frequency in the fixed frame, the frequencies observed in the two moving frames of reference will, in general, not be identical. By using the same doppler-shifted frequency in both moving frames of reference, he has not, in fact, matched the phase velocities, as he claims. From this viewpoint alone, the relations derived by Unz, including those applicable to a single stream, are incorrect.

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REFERENCES

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Unz H.	1962a	*J. Atmosph. Terr. Phys.* **24**, 685.
Unz H.	1962b	*Trans. I.R.E.* AP-10, 459.