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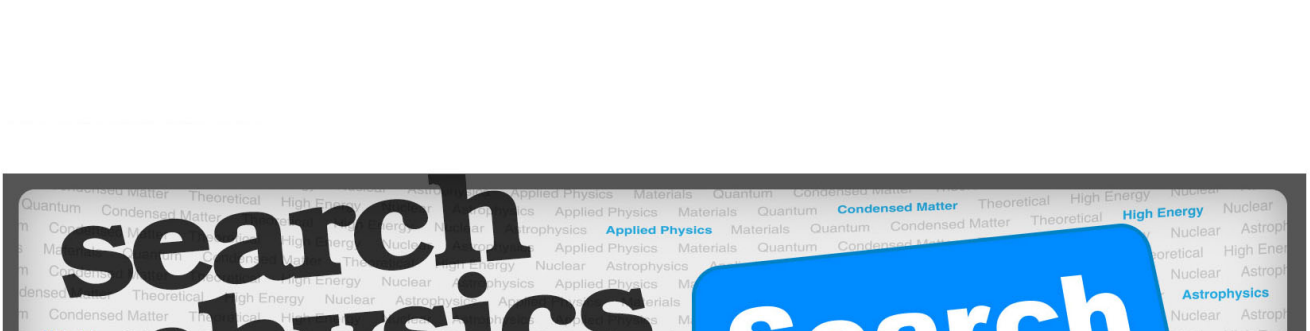

Response to "Comment on 'Large-scale Alfvén vortices'" [Phys. Plasmas 23, 034703 (2016)]

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In response to Kaladze comments on the paper,[1] we note the following. Eq. (16), i.e., $\varphi = v_A A$ serves as the solution of Eqs. (14) and (15) and apparently *both the linear and nonlinear terms* cancel each other. This is clearly demonstrated in our paper. In contrast to this statement, Kaladze comments that nonlinear terms are canceled whereas the linear terms remain. This statement contradicts with original assumption. Certainly, obtained solution of Eqs. (14) and (15) is not unique. For example, the same is true for well known dipole vortex solution in case of dispersive Alfvén wave. In our paper, we discussed this point at the last part of the second and at the beginning of the third pages. Additionally, φ should satisfy a number of conditions. First, the solution of the system of Eqs. (14) and (15) must be bounded and exponentially localised in the radial direction. Second, solution should satisfy the conditions of quasi-neutrality equation (18) and energy conservation equation (20). The obtained formulae ((16), (17), (20), and (26)) and Figs. 1–3 describe interconnected vortical magnetic fields and field-aligned electric fields.

Kaladze bears in mind one dimensional nonlinear structures of Alfvén waves. Such structures are really the subject of wave breaking if the nonlinear effects due to the scalar nonlinearity exceed those due to parallel dispersion. This is completely different structures termed one dimensional solitons which have a different geometry and nonlinear structure than our localised vortex structure, i.e., vortices of Alfvén waves studied in our paper. Thus, we consider the comments of Kaladze irrelevant and his conclusions erroneous.

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[1]O. Onishchenko, O. Pokhotelov, W. Horton, E. Scullion, and V. Fedun, Phys. Plasmas **22**, 122901 (2015).

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