Solitary kinetic Alfvén waves in bi-ion plasmas

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In the presence of heavy ions, a Sagdeev equation is obtained for the solitary kinetic Alfvén waves (SKAWs) in a low-β ($m_e/m_i \ll \beta \ll 1$ or $m_i/m_e \gg \alpha \gg 1$) cold plasma. Then the numerical solution can be calculated from the analytical expression and the basic equations set. The results show that the density humps of SKAWs can exist in the sub-Alfvénic region, and the heavy ion density amplitude and the width of the SKAWs rise with the increase in the initial density of heavy ions n_{b0} in such bi-ion plasmas. The wave phase velocity decreases in this case. The perturbed electromagnetic fields E_z, E_x, and B_y are also studied further to discuss the effects of heavy ions on them. These numerical results have been plotted for several different parameters.