Operator splitting and convergent schemes for the KdV and Benjamin–Ono equations

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The KdV equation and the Benjamin–Ono equation are of the form $u_t+uu_x=Au$ where $Au=u_{xxx}$ for the KdV equation and $Au=Hu_{xx}$ (H denotes the Hilbert transform) for the Benjamin–Ono equation. We study operator splitting for these two equations, as well as other related equations. Furthermore, we derive convergent and fully discrete finite difference schemes for the two equations.