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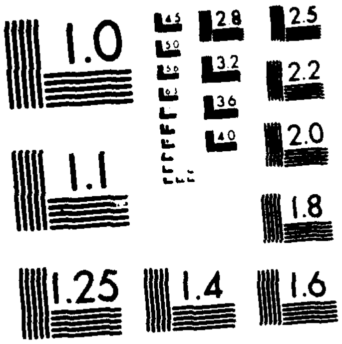

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We present numerical and theoretical results for self-trapped states in the lossless, saturably nonlinear Klein-Gordon equation $u_{tt} - u_{xx} = -u/(1 + u^2)$. A simple approximate analytic theory is developed which agrees well with self-trapped states found in simulations to emerge from certain types of localised, stationary, one-sided "displacements," $u(x,0) \geq 0$, $u_t(x,0) = 0$. The stability of these states to strong perturbations is studied by pulse-collision simulations, using for the perturbation one of the two traveling-wave pulses generated in the fast dissociation of a highly unstable initial displacement. The self-trapped states are highly stable, exhibiting a shape change and centroid shift after collision, but little energy loss or change of period.

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Self-trapped states in a saturable Klein-Gordon Equation

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abstract

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