Modified Serre-Green-Naghdi equations with improved or without dispersion.
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A two free parameters modification of the Serre equations is derived from a variational principle. These parameters are chosen in two ways.
(i) Choosing these parameters to improve the dispersion relation yields a better model for dispersive waves propagating in shallow water.

(ii) Choosing these parameters to kill the dispersion yields a regularization of the dispersionless shallow water equation. The resulting model is conservative and the regularized smooth shocks propagate at exactly the same speed as the discontinuous original ones.