

# Long Period Limit for the Symmetric Regularized Long Wave equation

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## Abstract

We study the Cauchy problem for the Symmetric Regularized Long Wave equation, namely,

$$\begin{cases} u_{tt} + u_{xx} + (uu_x)_t - u_{xxtt} = 0, & x \in \mathbb{R}, \quad t > 0, \\ u(x, 0) = u_0, & x \in \mathbb{R}. \end{cases} \quad (1)$$

We consider (1) in two different settings, the periodic and continuous initial value problems. We prove that under suitable conditions on the initial data that solutions on  $H_{per}^1(-l, l) \times L_{per}^2(-l, l)$  converge to the solution on  $H^1(\mathbb{R}) \times L^2(\mathbb{R})$ , as  $l \rightarrow \infty$ .

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