A Cauchy problem for a class of nonlocal and nonlinear equations arising in elasticity

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We will discuss the integro-differential Cauchy problem

$$
\begin{aligned}
u_{tt} &= (\beta * (u + g(u)))_{xx} \qquad x \in \mathbb{R}, \ t > 0 \\
u(x,0) &= \phi(x), \qquad u_t(x,0) = \psi(x) \qquad x \in \mathbb{R},
\end{aligned}
$$

where β is some integrable function whose Fourier transform satisfies a growth condition of the form

$$
0 \leq \widehat{\beta}(\xi) \leq C \left(1 + \xi^2\right)^{-r/2}.
$$

For certain choices of the convolution kernel β, the problem reduces to the well investigated Boussinesq type equations.

We prove general local well-posedness as well as global existence and blow-up results depending on β and on the behaviour of the nonlinear term $g(u)$.

The presentation is about the ongoing work, with Nilay Duruk (Sabancı University) and Hüsnü Ata Erbay (Işık University).