

## Comparison of solutions of some families of wave equations

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We will present a series of recent results concerning the comparison of solutions of two different wave-type equations in asymptotic regimes determined by two parameters characterising long waves and small amplitude.

There are many works in literature on similar comparisons within the scope of fluid dynamics. These comparisons are made between a model equation, typically the Camassa-Holm (CH) equation, and a parent equation, namely the Euler equation, the Boussinesq system, or similar.

In our work, we have considered the same question within the scope of nonlocal elasticity. In that respect we first show that the CH equation can be formally derived from the improved Boussinesq (IB) equation. We then give a rigorous justification of this, namely prove that solutions of the CH equation are well approximated by appropriate solutions of the IB equation. Conversely we show that solutions of the IB equation can be written as a sum of right and left going solutions of the CH equations up to a small error. These results can be generalised to nonlocal wave equations which have a similar dispersion relation as the IB equation in the long wave limit. Finally we consider the comparison of nonlocal equations and give estimates between solutions of two nonlocal wave equations.

This is a joint work with Saadet Erbay (Ozyegin University) and Husnu Ata Erbay (Ozyegin University).

### References

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