STABILITY OF THE CATENOID FOR THE HYPERBOLIC VANISHING MEAN CURVATURE EQUATION OUTSIDE SYMMETRY

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I will discuss joint work with Jonas Luhrmann and Sung-Jin Oh on the stability of the catenoid, which is a minimal surface, viewed as a stationary solution to the hyperbolic vanishing mean curvature equation in Minkowski space. The latter is a quasilinear wave equation that constitutes the hyperbolic counterpart of the minimal surface equation in Euclidean space. Our main result is the nonlinear asymptotic stability, modulo suitable translation and boost (i.e., modulation), of the n-dimensional catenoid with respect to a codimension one set of initial data perturbations without any symmetry assumptions, for n larger than or equal to 5. The modulation and the codimension one restriction on the data are necessary and optimal in view of the kernel and the unique simple eigenvalue, respectively, of the stability operator of the catenoid. In a broader context, this work fits in the long tradition of studies of soliton stability problems. From this viewpoint, our aim is to tackle some new issues that arise due to the quasilinear nature of the underlying hyperbolic equation.