STABLE BLOWUP IN THE WHOLE SPACE FOR GEOMETRIC WAVE EQUATIONS

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Abstract. A universal phenomenon among partial differential equations is the spontaneous breakdown of their solutions. This non-linear effect is encountered in evolution equations via blowup formation from smooth initial data in finite time. Such blowup profiles are known in closed form e.g. for the *co-rotational Wave Maps Equation* and the *equivariant Yang-Mills Equation* in supercritical space dimensions. The central question for their role in the dynamics of the equations concerns their stability, i.e. if this blowup mechanism occurs for a broad class of initial data. So far, stability results were only available in the region of the backwards lightcone of the singularity. The first global stability result was proved by Biernat-Donninger-Schörkhuber [1] for co-rotational wave maps from $(1+3)$-dimensional Minkowski spacetime into the 3-sphere. One of the key insights for the success of this work was the construction of a coordinate system called *hyperboloidal similarity coordinates*. By now, the methods have been expanded into a novel stability theory and implemented in the proof of the stability of blowup in the Yang-Mills equation in the whole space for all odd space dimensions [2]. A better understanding of the geometric and analytic interplay of hyperboloidal similarity coordinates with the equations will be relevant for further progress and the problem whether a well-defined continuation of the Cauchy evolution after the singularity is possible.

References

[1] Paweł Biernat, Roland Donninger, and Birgit Schörkhuber. Hyperboloidal similarity coordinates and a globally stable blowup profile for supercritical wave maps. *International Mathematics Research Notices*, 2017.

[2] Roland Donninger and Matthias Ostermann. A globally stable self-similar blowup profile in energy supercritical yang-mills theory. *arXiv preprint arXiv:2108.13668*, 2021.

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