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*Birkhoff normal form for wave equation null forms*

Theorems on global existence of solutions of nonlinear wave equations in  $\mathbb{R}^n$  depend upon a competition between the time decay of solutions and the degree of the nonlinearity. Decay estimates are more effective when inessential nonlinear terms are able to be removed through a well-chosen transformation. In this talk, we construct Birkhoff normal forms transformations for the class of wave equations which are Hamiltonian PDEs and null forms, giving a new proof via canonical transformations of the global (and 'almost global') existence theorems for null form wave equations of S. Klainerman and J. Shatah. I will also describe the potential further applications to PDEs of this technique of Hamiltonian dynamics. These results are work-in-progress with A. French and C.-R. Yang.