Computer algebra and nonlinear iterations for the development of the Periodic Wave Approximation NAPOLEON HERNANDEZ, RICHARD PRICE, University of Texas at Brownsville, BENJAMIN BROMLEY, University of Utah, CHRISTOPHER BEETLE, University of Florida — The periodic wave approximation, explored in the past few years by different people around the world, has a promising future modeling the gravitational waves obtained by a helical symmetric problem in General Relativity. The existence of a helical Killing vector allows the reduction in the number of degrees of freedom in the problem from 4 to 3. This situation promises to model adequately the slow inspiraling process of two black holes. The numerical solution of this problem involves the implementation of the eigenspectral method developed by Price et al., The motivation on the present is to show the set of computational tools that had been implemented in Maple© as an aid in the development of the solution for the full GR problem. To illustrate the utility of such tools, partial results will be shown, involving the solution of one component of the perturbation tensor in a second order post-Minkowski expansion. The results will include a comparison between the solutions obtained through a) a perturbative approach and b) a numerical solver approach (using Newton Raphson). Finally, a review of future work will be given, including future goals and extensions of the present work.

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