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Topological Deformations and the Homotopic Analysis Method Applied to a NLPDE Blazar Jet Model MITCHELL HARMON, KEITH ANDREW, ERIC STEINFELDS, MICHAEL CARINI, Western Kentucky University — We use a method of topological deformation to explore solving nonlinear partial differential equations as developed by Liao. In general the tools of algebraic topology, such as homotopic mapping, can be used to study topological spaces that can be continuously deformed into each other while keeping all topological quantities invariant such as continuity, dimension, connectedness and orientation. By introducing a homotopic deformation parameter one can use homotpic maps to solve a large class nonlinear differential equations. As a result of the mapping a single nonlinear partial differential equation can be converted into an infinite system of linear ordinary differential equations of higher order in the deformation parameter, thereby producing ODEs of different deformation order. These equations are then solved using a Maclaurin deformation series method. Here we apply this technique, the Homotopy Analysis Method, to a NLPDE that appears in certain Blazar jet models and explore the convergence properties of the solutions.

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