1145-34-1340 **Shiping Cao**, **Anthony Coniglio*** (`coniglio@iu.edu`), **Xueyan Niu**, **Richard Rand** and **Robert Strichartz**. *The Mathieu Differential Equation and Generalizations to Infinite Fractafolds.*

One of the more well-studied equations in the theory of ODEs is the Mathieu differential equation. Because of the difficulty in finding closed-form solutions to this equation, it is often necessary to seek solutions via Fourier series by converting the equation into an infinite system of linear equations for the Fourier coefficients. In this talk we present results pertaining to the stability of this equation and convergence of solutions. We also investigate ways to modify the linear-system form of the equation in order to study a wider class of equations. Further, we provide a method in which the Mathieu differential equation can be generalized to be defined on an infinite fractafold, with our main focus being the fractal blow-up of the Sierpinski gasket. We discuss methods for studying the stability of solutions to this fractal differential equation and describe further results concerning properties and behavior of solutions. (Received September 21, 2018)

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