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Joshua M. Whitlinger* (whitlingerjm@vcu.edu), 4118 Grace Harris Hall, 1015 Floyd Avenue, Richmond, VA 23220, and **Edward L. Boone** and **Ryad Ghanam**. *Estimating the Fraction in Fractional Differential Equations using a Bayesian Approach*.

The extraction of natural gas from the earth has been shown to be governed by differential equations concerning flow through a porous material. Recently, models such as fractional differential equations have been developed to model this phenomenon. One key issue with these models is estimating the fraction of the differential equation. Traditional methods such as maximum likelihood, least squares and even method of moments are not available to estimate this parameter as traditional calculus methods do not apply. In this work we develop a Bayesian approach to estimate the fraction of the differential equation and use this approach to adequately quantify the uncertainties associated with the error and predictions. A simulation study is presented as well to assess the utility of the modeling approach. (Received August 24, 2016)