1135-62-2628 **Joshua M Whitlinger*** (`whitlingerjm@vcu.edu`), Virginia Commonwealth University, PO BOX 843083, Richmond, VA 23284, and **Edward L Boone** (`elboone@vcu.edu`) and **Ryad Ghanam** (`raghanam@vcu.edu`). *A Bayesian Estimation for the Fractional Order of the Differential Equation that Models Transport in Unconventional Hydrocarbon Reservoirs.*

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. We develop a Bayesian approach to estimate the fraction of the order of the differential equation that models transport in unconventional hydrocarbon reservoirs. In this paper, we 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 September 26, 2017)