Applied mathematics in Petroleum Engineering

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Abstract. Some analytic studies on filtration combustion will be presented. We will consider mathematical models describing the phenomenon in different physical configurations. Some examples that will be considered: the existence and uniqueness of solutions was considered for combustion in foams and in porous media, taking into account the thermal losses. The models are composed of Partial Differential Equations (Balance Laws). The corresponding Riemann Problem solutions are presented as a sequence of contact waves and traveling waves using techniques from Conservation Law Theory and Dynamical Systems. Analytic estimates are validated through numerical simulations using Finite Element Method.