Estimation of oil pressure using nonlinear fractional partial differential equations.

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Using a combination of laboratory experiments and computer simulation we show that microwaves reflected from and transmitted through soil have a fractal dimension correlated to that of the soil's hierarchic permittivity network. The mathematical model relating the ground-penetrating radar record to the mass fractal dimension of soil structure is also developed. The fractal signature of the scattered microwaves correlates well with some physical and mechanical properties of soils. We present a mathematical model that give us an estimation of oil pressure in a Mexican oilfield, for the next 20 years. This model is based in fractional derivatives that we obtain from fractal dimension of the porosity. If a variable t moves in a fractal object of dimension v, it will induce a fractional derivative (Caputo fractional derivative) of order v. Then the mathematical model became a nonlinear fractional partial differential equation. that give us an estimation of oil pressure for the next 20 years.

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