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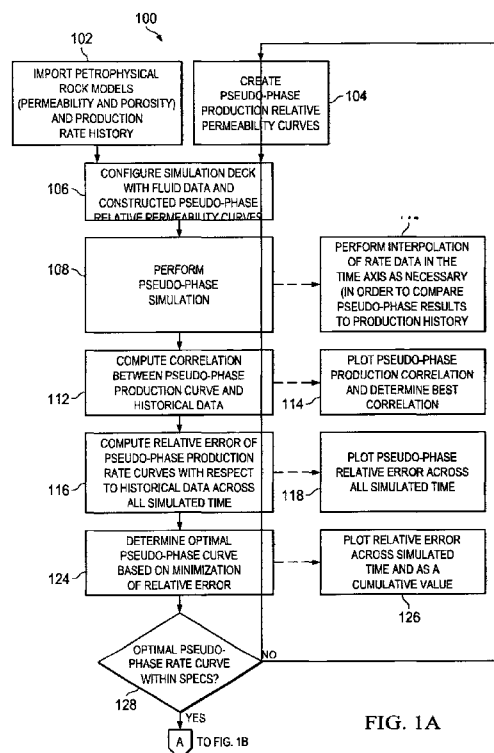


FIG. 1A

(57) Abstract: The disclosed embodiments include a method, apparatus, and computer program product for approximating multiphase flow reservoir production simulation. For example, one disclosed embodiment includes a system that includes at least one processor and memory coupled to the at least one processor, the memory storing instructions that when executed by the at least one processor performs operations that includes generating a set of pseudo-phase production relative permeability curves; receiving production rate history data; receiving simulation configuration parameters; performing flow simulation using the set of pseudo-phase production relative permeability curves; determining an optimal matching pseudo-phase production simulation result that best matches the production rate history data; and performing relative permeability inversion using signal processing analysis of production rate history data to approximate relative permeability curve descriptions with quantified uncertainty.