

Production Enhancement With Acid Stimulation Pdf

Acid Stimulation Production Enhancement with Acid Stimulation Numerical Simulation of Acid Stimulation Treatments in Carbonate Reservoirs Concluding Observations on the Locomotor System of Medusae The Journal of Experimental Medicine Integrated Method to Evaluate Acid Stimulation of Horizontal Wells in Carbonate Reservoir Through Treatment Pressure Analysis Diet and Food Philosophical Transactions of the Royal Society of London British Journal of Dental Science The Lancet A Text-book of Pharmacology, Therapeutics and Materia Medica Philosophical Transactions of the Royal Society of London Edinburgh Medical Journal Acid Stimulation Schizophrenia, an Integrated Approach The Use of Acid Stimulation for Restoring to Production Shut-in Oil Fields The American Naturalist British Medical Journal Nature The British Medical Journal Carl T. Montgomery Leonard Kalfayan Rencheng Dong George J. Romanes Kenji Ueda Alexander Haig Royal Society (Great Britain) Thomas Lauder Brunton Roger Delbaere (University of Manitoba student) Alfred Auerback

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stimulation of oil gas and injection wells with acid is almost as old as the petroleum engineering industry itself but the science and technology of acidizing has undergone striking changes in recent years spe s latest book acid stimulation ensures a comprehensive and up to the minute presentation by including an author team of 19 subject matter experts all at the forefront of the development of acidizing technology each chapter authored separately by individuals from the author team delivers an authoritative presentation of the key areas of acid stimulation providing an important

in this new second edition author leonard kalfayan has updated his 2001 book on acid

stimulation one of the primary methods for improving productivity of oil gas injection and disposal wells a properly designed and executed acid job can improve cash flow kalfayan offers practical guidelines for acid treatment design by stressing a systematic approach to candidate selection treatment design as well as execution and evaluation for improvement in profits and productivity the new edition includes discussions of modern acid systems and treatment methods with worldwide applications for both carbonate and sandstone formations new concepts for simplifying and proliferating sandstone acid application the latest in carbonate matrix and fracture acidizing more on non conventional acidizing concepts and acid systems and more on geothermal well stimulation as with his original book readers can find practical useful acidizing information and gain greater understanding and appreciate of its benefits

matrix acidizing and acid fracturing are two main types of acid stimulation treatments that are extensively employed by industry in carbonate reservoirs to improve permeability and enhance production matrix acidizing involves injecting acid to dissolve minerals in order to create long highly conductive channels wormholes whereas acid fracturing is used to etch fracture surfaces and create fracture conductivity numerical modeling of acid stimulation treatments couples processes of fluid flow reactive transport and rock dissolution which imposes great computational challenges the purpose of this dissertation is to develop efficient and accurate numerical models for acidizing process and acid fracturing process respectively in most of matrix acidizing simulations acid transport is generally solved by a single point upwinding spu scheme based on finite volume method simulation results of wormhole growth may have large numerical errors due to grid orientation effect of spu scheme in this work we apply adaptive enriched galerkin eg methods for solving coupled flow and reactive transport equations of acidizing model eg is constructed by enriching the standard continuous galerkin cg finite element method with piecewise constant functions since eg is a higher order method compared with standard finite volume method eg reduces non physical numerical errors caused by grid orientation effect wormhole growth usually exhibits fingering patterns which requires very fine mesh to resolve instead of global mesh refinement we apply adaptive mesh refinement technique to dynamically refine the mesh in the vicinity of wormhole interfaces and coarsen the mesh after dissolution fronts pass the simulation runtime using adaptive mesh is only about 30 of the runtime using globally refined mesh in our numerical examples the key to success in acid fracturing treatments is to achieve non uniform acid etching on fracture surfaces carbonate reservoir heterogeneity such as heterogeneous mineral distribution can lead to non uniform acid etching in addition the non uniform acid etching can be enhanced by the viscous fingering mechanism by injecting a low viscosity acid into a high viscosity polymer pad fluid acid tends to form viscous fingers and etch fracture surfaces non uniformly acid fracturing simulations rarely modeled the effect of acid viscous fingering in this work a 3d acid fracturing model is developed to simulate acid etching process with acid viscous fingering our acid fracturing model considers fluid flow inside the fracture acid and polymer transport and change of fracture

geometry due to mineral dissolution a numerical simulator is developed to solve the acid fracturing model and compute the rough acid fracture geometry induced by non uniform acid etching we investigate the effects of viscous fingering perforation design and alternating injection of pad and acid fluids on the acid etching process our model is capable of simulating growth of acid etched channels caused by acid viscous fingering according to our simulation results properly increasing the number of perforations can restrain the height of acid etched channels and help sustain acid fracture conductivity under the reservoir closure stress compared with single stage acid injection multi stage alternating injection of pad and acid fluids leads to narrower and longer acid etched channels which improves the effectiveness of acid fracturing treatments

unlocking a tight carbonate formation for oil and gas production by multi stage acid stimulation is a relatively cost effective method as an alternative to propped fracturing for production enhancement depending on whether treatment pressure is below or above the formation closure stress acid stimulation is basically divided into matrix acidizing and acid fracturing in this study practical methodology to evaluate both matrix acidizing and acid fracturing through treatment monitoring is presented respectively for matrix acidizing monitoring and optimizing a matrix acidizing has been achieved by integrating a forward model used in acidizing design for horizontal wells with a real time monitoring model for skin evolution during the stimulation the effect of acidizing is described as an overall skin factor change and productivity improvement is predicted for the treatment then the field treatment data monitored on site was used to estimate the skin response by treatment injection history matching procedure of design and actual treatment data will be carried out to update near wellbore and key wormholing parameters through sensitivity study which parameter should be updated is discussed finally optimum rate schedule is identified based on updated parameters meanwhile for acid fracturing treatment new method for real time monitoring of acid fracturing the inverse injectivity vs superposition time function plot is proposed subject to the condition that the treatment pressure is above closure pressure after the breakdown combining a linear dual porosity transient slab model with injectivity concept actual growing cross sectional area induced by acid fracturing treatment can be monitored in real time after production starts linear flow diagnostic approach with rate transient analysis provides cross sectional area flowing from matrix which is compared with the area induced by acid fracturing during the stimulation the treatment efficiency provides engineers with additional information as to whether the designed acid fracturing was performed appropriately under the in situ closure stress field a field case example of both multi stage matrix acidizing and acid fracturing acid in horizontal well are also presented respectively in the study to illustrate the application of the approach developed and to show the value of the integrated approach to monitor and diagnose acid stimulation in horizontal wells the electronic version of this dissertation is accessible from hdl handle net 1969 1 155416

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