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International Journal of Electrical and Computer Engineering
Volume 10, Issue 5, October 2020, Pages 4639-4644

Design of computerized monitoring and processing system for magnetic field controlling against the phenomenon of black powder in crude oil pipelines (Article) (Open Access)

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Abstract

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Black power represents the main difficulty faced by the oil flow in pipelines. The negative effect of this powder reaches to stop the oil flow due to clogging the pipelines, in addition to the damaging of the crude oil pumps. Many solutions have been proposed in literature based on chemical or physical processes. On the other side, applying the fixed magnetic field has been presented in separation and extraction process of metal impurities in water pipelines applications. From these facts, this paper proposes an alternative solution (idea, design, and methodology for future implementation) for the black power removing from oil pipelines. The proposed system works on firstly sensing the resistivity parameter in the crude oil as an indication about the oil status with respect to the quantity of the black powder particles, then works on monitoring and controlling the level, location, and polarity of the required magnetic field that to work on cracking particles cracking function that in order to facilitate the crude oil motion in the pipelines. In addition, the proposed solution presents a new design of electrical resistivity sensor as an important indication in terms of evaluating the proposed system performance. Copyright © 2020 Institute of Advanced Engineering and Science. All rights reserved.

SciVal Topic Prominence ⓘ

Topic: Asphaltenes | Petroleum | Cubic Equations

Prominence percentile: 98.863 ⓘ

Author keywords

Alternative solution Black powder Computer system Controlled magnetic field Conventional removal methods Resistivity sensor

Funding details

Funding text

The authors appreciate the financial support provided by school of University of Ras Al Khaimah – UAE, www.aurak.ac.ae/en/school-of-engineering/.

ISSN: 20888708

Source Type: Journal

Original language: English

DOI: 10.11591/ijece.v10i5.pp4639-4644

Document Type: Article

Publisher: Institute of Advanced Engineering and Science

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