



Cairo University

DEVELOPMENT OF HYDRAULIC MODEL FOR FOAM DRILLING IN VERTICAL WELLS

By

Seydou Sinde

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in

PETROLEUM ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

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DEVELOPMENT OF HYDRAULIC MODEL FOR FOAM DRILLING IN
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UBD; Foam; hydraulics; Rheology, Cuttings.

Summary:

In this work, a new development of foam drilling hydraulic model and converting this model to user interface program are proposed. They can be used to better simulate the foam drilling hydraulic calculations for vertical wells. The development model considers foam as a Non-Newtonian power-law fluid in spite of the dispute that still persists among the researchers. Results of the proposed model revealed that the foam flow is greatly affected by the injection pressures, injection flow rates (liquid and gas flow rates), bottomhole temperature, drilling rate (ROP), cutting sizes and densities, formation fluid influxes and the surface back pressure. The model also proposes a try-and-error procedure to initially determine the best selections of the injection pressure and the injection rates of both liquid and gas. The model evaluation and validation were tested by running the program on two actual wells drilled underbalanced with foam in the Middle East with an absolute average error that could not exceed 2.56 % in the first well and 10.85 % in the second well, and these are very good and encouraging results.

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Dedication

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