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CS401

Simulation Research on Back Flushing Time of High Pressure Back Flushing Filter Station

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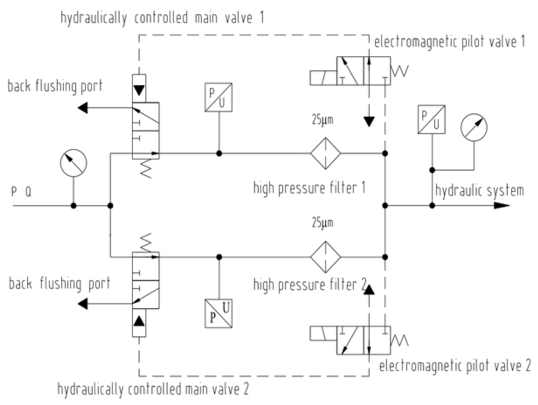
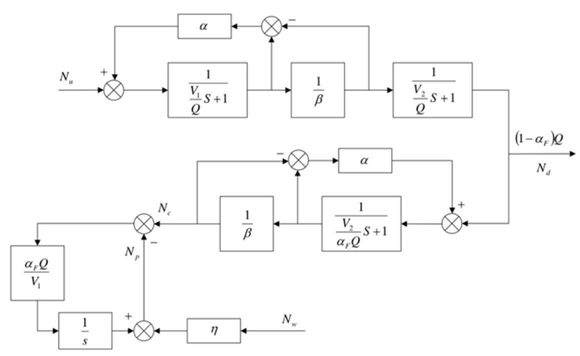
Introduction

Current researches of emulsion back flushing filter station mainly concentrate on function design and control , but few researches are on the performance of back flushing time, back flushing efficiency and so on. Filter material such as quartz sand media and walnut shell are used in other fields , the back flushing filter mathematical model is established, and the theoretical back flushing time is calculated, which has some references to the design of high pressure back flushing filter station. A back flushing filter pollution control mathematical model is established in simplified , which doesn't reflect the influence of each parameter. According to the emulsion back flushing filter station principle in ore and pollution control model equilibrium theory ,the pollution control model and AMESim simulation model are constructed for high pressure emulsion back flushing filter station, the parameters influence relation for back flushing efficiency parameters and flow are investigated in this paper.

Principle and mathematical model



Principle of high pressure back flushing filter station

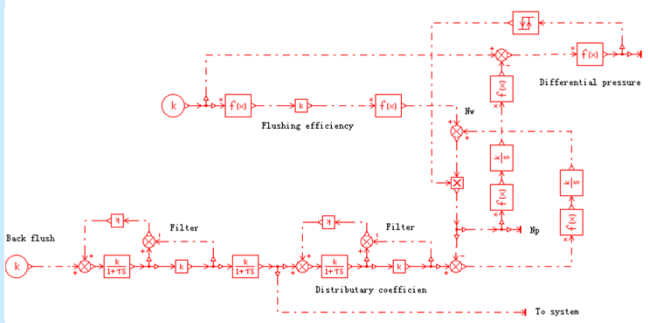


Back flushing pollution control model

Back flushing cavity pollution equilibrium equation:

$$N_p V_1 = N_w V_1 + \int (N_c - N_p)\, \alpha_F Q dt$$

Modeling and simulation

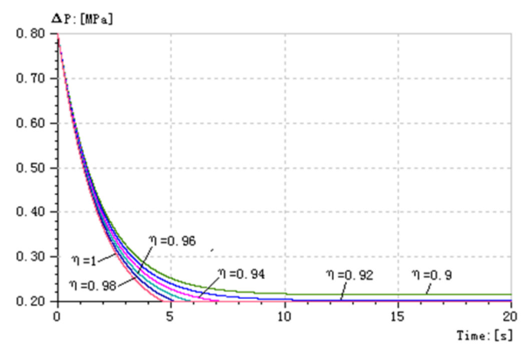


Back flushing simulation model

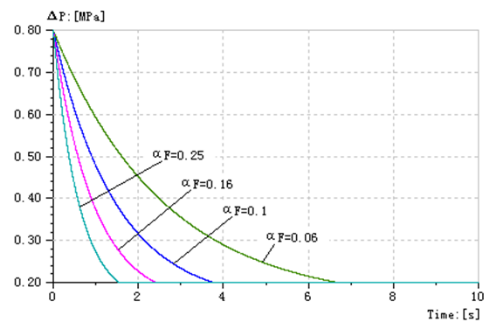
Parameter	Value
Filter cavity inlet	1 L
Filter cavity outlet	1 L
Filter ratio in filter core	100
Flow through filter station	400 L/min
Initial differential pressure in filter core	0.15 MPa
Back flushing stopped differential pressure	0.2 MPa
Ultimate differential pressure in filter core	0.8 MPa
Quantity of pollutants received	769.3 g
Repetition filter factors	0～0.95
Back flushing flow division coefficient	0.06～0.25
Back flushing efficiency	0.6～1

Parameters

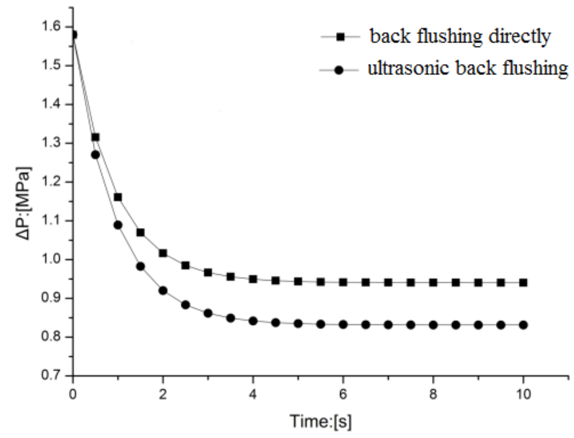
Results and discussion



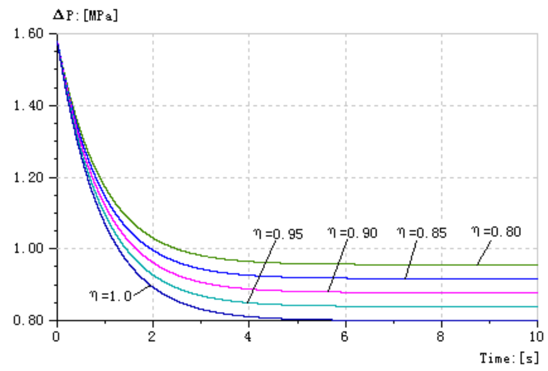
Effect of back flushing efficiency and results



Effect of division coefficient and back flushing results



Experimental curves of back flushing directly and ultrasonic back flushing



Back flushing simulation curves

Conclusion

From above the back flushing pollution control model simulation, the results are as follows:

1) The higher the back flushing efficiency is, the shorter the back flushing time is. Ultrasonic wave or vibration can be adopted to improve the back flushing efficiency.

2) The higher the flow division coefficient is, the shorter the back flushing time is, and the more the flow is used for the back flushing, the higher the cost is. Therefore, reasonable selection and design of the flow division coefficient and back flushing time are necessary.

3) The back flushing model based on pollution control is effective that provides necessary theoretical criterion for the optimization design of the back flushing filter station.

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