

NUMERICAL INVESTIGATION OF OIL REMOVAL FROM SOIL USING ULTRASOUND EFFECT

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ABSTRACT

Soil contamination is a big problem facing the whole world as it affects majorly all facets of life. The soil flushing method enhanced by ultrasonic waves is a new, potential and efficient technique for in situ remediation of the ground contaminated by NAPL hydrocarbons. This study investigated the effectiveness of ultrasound enhancement in the soil flushing method for a range of conditions involving treatment time, hydraulic gradient and the discharge velocity. The numerical investigation was performed using MATLAB to develop a program to determine the effectiveness of ultrasound enhancement in soil flushing method. The test result indicated that the rate of the contaminant extraction increased considerably with increasing sonication time up to 120 seconds with 34% contaminant removed without sonication and 64.05% contaminant removed with sonication and started decreasing at the level where cavitation occurred. Increasing the sonication time will increase the contaminant removal up to the level where cavitation occurs. The effectiveness of sonication decreases with hydraulic gradient but eventually becomes constant under higher flow rates and also is highly related with the discharge velocity. It can be concluded from the research work that soil flushing with ultrasound effect can increase the rate of contaminant removal from soil.

KEYWORDS: In Situ Remediation, NAPL Hydrocarbons, Ultrasound Enhancement, Soil Flushing, Soil Remediation, Cavitation