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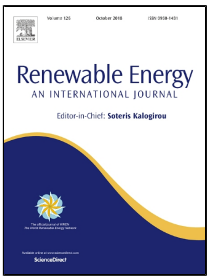


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# Analytical Model for Heat Transfer between Vertical Fractures in Fractured Geothermal Reservoirs during Water Injection

Mahdi Abbasi[1, *], Mehrshad Mansouri[2], Amin Daryasafar[3**], Mohammad Sharifi[1]

1. Department of Petroleum Engineering, Amirkabir University of Technology (Polytechnic of Tehran), Tehran, Iran, P.O. Box: 15875-4413.

2. Institute of Petroleum Engineering (IPE), School of Chemical Engineering, College of Engineering, University of Tehran, Tehran 11365-4563, Iran.

3. Department of Petroleum Engineering, Petroleum University of Technology, Ahwaz 6198144471, Iran

Corresponding authors:

[*] Mahdi Abbasi; E-mail: m.abbasi1370@gmail.com.

[**] Amin Daryasafar; E-mail: amindaryasafar@yahoo.com, Tel: +989173770839

## Abstract

In recent years, the demand for energy has vastly increased due to rapid commercialization. This increasing requirement has put a further strain on the conventional power generation units. In this paper, the problem of water injection into a fractured geothermal reservoir in Cartesian coordinate is considered and an exact analytical solution has been presented to describe the transient temperature distribution and advancement of the thermal front generate due to transient temperature of heat depleted water in a coupled fracture–matrix system at the scale of a single fracture. This solution is able to explain the following phenomena: convection transport in fractures, conduction heat transfers in matrix block and heat flux transfer between rock matrix and fracture. Also, the heat transfer shape factor can be defined by employing the convection-conduction equation in matrix and fracture. The derived analytical solution was used for investigating early and late time periods of heat transfer phenomenon in naturally fractured reservoirs. In addition, a conceptual definition for thermal recovery efficiency has been offered as