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Development of a hydraulic stimulation simulator toolbox for enhanced geothermal system design

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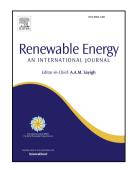
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ACCEPTED MANUSCRIPT **Development of a Hydraulic Stimulation Simulator Toolbox for Enhanced** 1 **Geothermal System Design** 2 3 Sehveok Park^a, Kwang-Il Kim^a, Saeha Kwon^a, Hwajung Yoo^a, Linmao Xie^a, Ki-Bok Min^a*, 4 Kwang Yeom Kim^b 5 6 ^aDepartment of Energy Resources Engineering, 7 Seoul National University (SNU), 1, Gwanak-ro, Gwanak-gu, Seoul, 08826, Republic of Korea 8 ^bKorea Institute of Civil Engineering and Building Technology (KICT), 283, Goyang-daero, 9 10 Ilsanseo-gu, Goyang-si, Gyeonggi-do, 10223, Republic of Korea 11 Corresponding Author (Ki-Bok Min), e-mail: kbmin@snu.ac.kr 12 13 Abstract 14 15 Hydraulic stimulation is the key technology in the enhanced geothermal system (EGS) 16 17 development. In this study, a reservoir stimulation simulator toolbox was developed for the comprehensive EGS design considering the natural fracture distribution, borehole stability, hydraulic 18 stimulation and the thermal performance of the reservoir. The toolbox program consists of five 19 modules, i.e., 3D discrete fracture network (DFN) generation, borehole stability analysis, 20 hydrofracturing estimation, hydroshearing estimation and reservoir temperature prediction. Each 21 module is implemented with graphic user interface using MATLAB[®] and available as a stand-alone 22 program. The program allows independent analysis of each module and combined analyses with 23 compatible data among the related modules, which provides extensive applicability to a variety of 24 25 tasks associated with EGS stimulation, shale gas fracturing and CO₂ geosequestration. Keywords: enhanced geothermal system, hydrofracturing, hydroshearing, discrete fracture network, 26

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borehole stability, reservoir temperature

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