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Geothermal fluid flow derived from microseismic observation
—A case study of Kuju volcanic field, central Kyushu, Japan—

Kenji Kubota[1)], Jun Nishijima[2)], Yasuhiro Fujimitsu[2)] and Sachio Ehara[2)]

1) Laboratory of Geothermics, Department of Earth Resources Engineering, Graduate School of Engineering, Kyushu University
2) Laboratory of Geothermics, Department of Earth Resources Engineering, Faculty of Engineering, Kyushu University

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ABSTRACT An active fumarolic field called Kuju-iwoyama exists in the central part of Kuju volcano in central Kyushu, Japan. Hatchobaru geothermal field is situated about 5 km northwest of Kuju volcano. Microearthquake activities at Kuju-iwoyama and in Hatchobaru geothermal field are very high. Since these fields are the zones where geothermal fluid ascends and flows laterally, microearthquakes may occur by geothermal activity. In this paper, we observed microearthquakes at Kuju-iwoyama and in Hatchobaru geothermal field, and investigated the relation between microearthquakes and geothermal fluid flow.

At Kuju-iwoyama, a high microearthquake activity zone exists just beneath the fumarolic area down to about 1.5 km. In Hatchobaru geothermal field, hypocenters exist at a depth of about 1 km to 4 km. We constructed a thermal conceptual model to interpret the relationship between microearthquake activity and geothermal fluid and we did numerical simulation of geothermal fluid flow in both fields and compared geothermal fluid flow with observed hypocenter distribution. As a result, most of microearthquakes occur in the upflow zone of geothermal fluid. In the upflow zone, the simulated pressure is higher than that in surroundings, so we concluded that it is easy to rise pore fluid pressure and enables microearthquakes to occur.

Key words: microearthquakes, Kuju volcanic field, geothermal fluid flow, numerical simulation, pore fluid pressure

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