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Hydromechanical modelling of the hydraulic stimulation of a fault zone as deep geothermal target

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In the framework of the H2020-DEEPEGS project the main technological challenge addressed is to optimise the well architecture and stimulation methods for different geological contexts in order to demonstrate the economic and technical viability of the deep geothermal exploitation. One of the two demonstrators, the VDH French doublet, targets a fault zone in the granitic basement as deep geothermal system in a rifting context (Upper Rhine Graben in eastern France).

This paper aims to conceptualize a fault zone to represent an equivalent hydromechanical behaviour. The objective is to keep the major features of the fault zone while simplifying secondary features that will make the model too complex. The question of how to realize such a conceptualization depending on the knowledge of tectonic context, lithology, hydraulic behaviour of each part of the fault zone and existing data will be addressed. This conceptual model will be used to model hydromechanical processes acting during the hydraulic stimulation of a well in such specific fractured context. Thanks to a DFN numerical model, built on the base of the conceptualization step, the efficiency of hydraulic stimulation will be tested with respect to the well trajectory. The results of the simulations will be analysed to get a qualitative response of the stimulated fracture network (most stimulated fractures and an estimated gain of their hydraulic aperture) around the open hole of the well and an improvement of the global well productivity enhancement.