Danish Offshore Technology Centre
Technology Conference 2022

Crack detection and quantification in oil well cement sheaths for leak estimation

Pablo Alberdi-Pagola, Gregor Fischer

The formation of cracks and interfacial damage at the primary cement sheath compromises the overall structural stability, imperviousness, and durability of the system. These cracks also provide a flow path for fluids through the cement sheath, leading to leaks of hydrocarbons to the environment. Therefore, it is necessary to investigate the possible flow paths due to crack formation in the i) interface between the cement and casing, ii) interface between cement and rock formation, and iii) in the radial direction of the cement sheath. The mechanisms that may provoke cracking have been investigated, and the cracks developed due to the restrained shrinkage of the cement and the expansion of the steel casing have been measured using digital image correlation (DIC). Hydrocarbon leaks in cracked cement sheaths have been estimate by replicating the cracks detected in previous tests and measuring the flow of water through them using a newly developed test setup.

AARHUS UNIVERSITY
UNIVERSITY OF COPENHAGEN
DTU
GEUS
AALBORG UNIVERSITY DENMARK