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Surface characterization of pipeline surface using replica techniques HAMZA SHAMS, KANZA RAHMAN, MOHSIN AZIZ RAJA, RAJA HAMZA SAJID, MUHAMMAD FAHAD KHAN, DHA Suffa University — Pipes are widely used in the petroleum industry for distribution of refined oil. During their service life they lose their surface characteristics. Replica techniques provide a non-destructive way to analyze on-field pipelines for surface cracks and impregnation due to corrosion. The use of replica techniques provide an effective way to predict failure characteristics of these pipes. This study aims to compare the different replica techniques used in such investigations. Atomic force microscopy (AFM) coupled with standard optical microscopy has been used to evaluate surface topography of the actual and the replica surface. The surface micrograph obtained from the replica is then inverted and analyzed for variations through software analysis. The variations are representative of the resolution of the replica technique and has been used to compare multiple replica techniques in standardized scenarios to quantify their effectiveness in on-field applications. The metallographic analysis through optical microscopy has been used to validate the methodology to develop a replica surface. The investigation summates on providing a comparative conclusion for the choice of replica techniques based on varied standardized on-field scenarios.

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