Mechanical and Industrial Engineering-College of Engineering-Sultan Qaboos University

# Assessment of Pipelines with Multiple Corrosion Defects – Code and Numerical Solution

**Hussain Hamed Al Naamani**

## Abstract

Pipelines are the main method of oil and gas transportation due to economics and safety. However, the use of carbon steel as a material type has led to the introduction of pipeline defect assessment due to the increased probability of corrosion threat. Several assessment methods have been developed over the years to assess corrosion defects in pipelines. Corrosion defects can occur in pipelines internally or externally in the form of single or clustered defects. As the distance between two corrosion defects decreases, they will begin to interact reducing the failure pressure compared to when they are treated as single defects. Although there have been studies on this subject, oil and gas pipeline operators are still faced with inconsistencies with the decision upon which closely spaced defects can be clustered as single defects. In this work, the influence of surface location (internal or external) and depth on defect interaction were analyzed using finite element analysis and further compared with analytical methods. The pipes were modeled with curved boxed defects at different spacings and orientations to simulate actual metal loss defects. Comparison of the results showed conservatism in the existing analytical methods which may result in unnecessary shutdowns, repairs, and operating below the required parameters. The numerical results showed that defect surface location (internal or external) and depth has a great influence on the defect interaction and predicted failure pressure.