SC/Tetra

Cradle
MSC Software Company

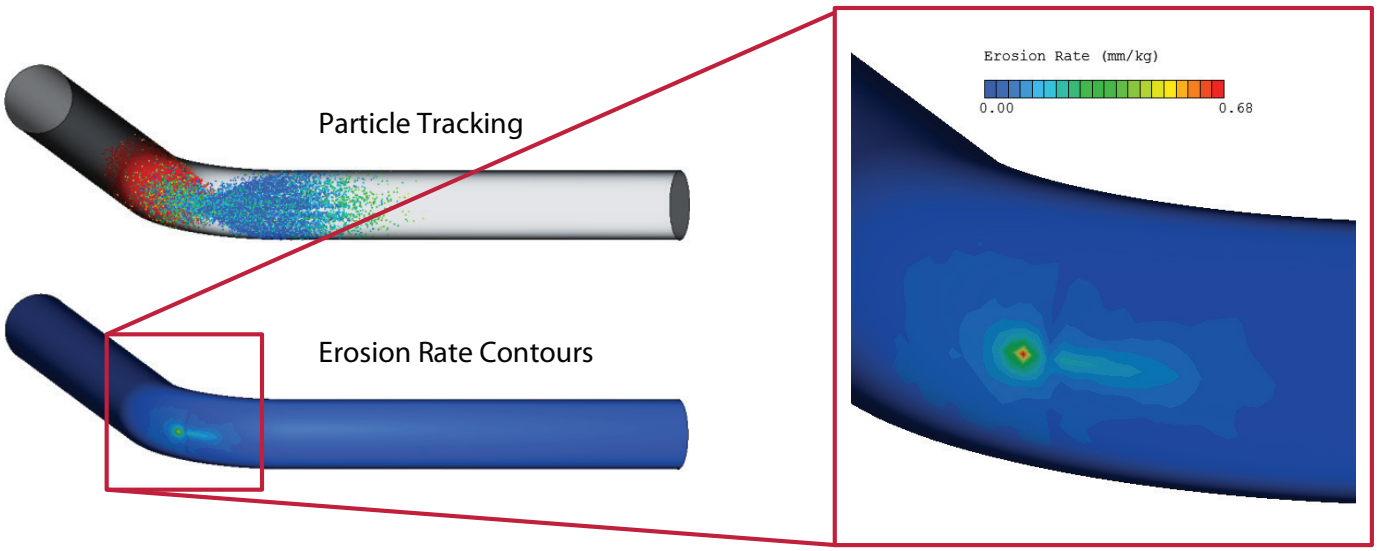
Erosion Modeling in Oil and Gas Pipelines

An SC/Tetra User Defined Function available to generate three widely used erosion models of the internal erosion of oil and gas pipelines by transported sand particles.

Overview

Pipeline erosion is a major problem for the petroleum industry. High concentrations of suspended sand are often present along with the hydrocarbons extracted from a producing well. When sand particles collide with the internal walls of pipes and control quipment they can wear away the wall material. The consequences of pipeline erosion can be very serious in terms of nvironmental impact, lost production, and repair costs. Computational Fluid Dynamics (CFD) can be used to inexpensively predict the susceptibility to erosion for specific pipeline configurations and sand loads. This capability is valuable and highly cost-effective for both the design of new pipelines and the assessment of existing equipment. In this way, CFD modeling can eliminate, reduce, or enhance more traditional erosion assessment by physical modeling or pipeline inspection.

Sand Transport around a 90° Elbow



Features

The SC/Tetra UDF for erosion modeling builds upon the already outstanding features and efficiency of the standard CFD code. The engineer can select from three erosion models and two particle rebound algorithms. Erosion can be calculated using default parameters or user-inputs and the SC/Tetra Postprocessor can then be used to visualize the results in various popular erosion units. The features of the erosion model can also be customized by modifying the UDF source code.

Erosion Models

- Tulsa/ECRC
- Tabakoff and Grant
- Finnie

Particle Rebound Models

- Tabakoff and Grant
  (with optional statistical variation)
- Forder

Postprocessing Capabilities

- Contour maps of erosion rate or relative erosion
  - (kg/m^2.s)
  - (mm of wall thickness/kg of sand)
  - (kg of wall material/kg of sand)
  - English units can also be used
- Particle tracking animations
- Streamlines