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Fighting Flow-Induced Localized Corrosion with Drag Reducing Additives

By

Professor Günter Schmitt

Institute for Maintenance and Corrosion Protection Technology
Iserlohn, Germany

Presided by

Dr. S. S. Gupta

Executive Director (M & I), Pipelines Head Office
Indian Oil Corporation Limited
Pipelines Division Noida

Time and Date: 18.15 hrs (IST), 8th October 2021

Organized by

Dept. of Metallurgical Engineering and Materials Science, IIT Bombay
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Meeting number (access code): 2517 212 6158	Meeting number (access code): 2517 212 6158
Date: 8 th October 2021 Time: 18.15 hrs (IST)	Meeting Password: mFkPP3r2Bp9

Fighting Flow-Induced Localized Corrosion with Drag Reducing Additives

Prof. Dr. rer. nat. habil. Günter Schmitt

Institute for Maintenance and Corrosion Protection Technologies n.f.p.Ltd.

Kalkofen 4, D-58638 Iserlohn, Germany

gue.schmitt@t-online.de



Abstract

Flow induced localized corrosion (FILC) is initiated by high-energy near-wall turbulence elements which impinge the surface vertically with energy densities higher than the fracture stress of protective scales. We developed a methodology to quantify such “Freak Energy Densities” and how to influence its value by drag reducing additives. Among such additives different kinds of corrosion inhibitors were found to exhibit both corrosion reducing and flow improving properties. While corrosion reduction is caused by molecular adsorption onto the materials surface, drag reduction is related to flow-induced concentrating and aggregating of inhibitor molecules in or near the viscous sublayer of the turbulent boundary layer which interact with impinging high-energy near-wall turbulence elements via energy dissipation, thus reducing its impact energy. The paper describes the methodology to quantify “Freak Energy Densities” and to quantify the effect of flow improving additives. It elaborates on structural requirements for organic molecules to efficiently decrease the friction (wall shear stress) between solid surfaces and the fluid.

Short Bio – Professor Günter Schmitt

Prof. Günter Schmitt has done his Graduation and PhD in Chemistry at Aachen University of Technology, Germany. He has professorship experience in Chemical Engineering at Aachen University of Technology (1978-1983), at Ruhr-University of Bochum (1983-1985) and for Corrosion Protection Engineering at Iserlohn University of Applied Sciences (1986-2007)

Since 2005, He is the CEO and shareholder of IFINKOR-Institute for Maintenance and Corrosion Protection Technology n.f.p.Ltd, Iserlohn, Germany. He has publications over 350 papers in chemistry and corrosion protection; special research interests: corrosion mitigation in oil and gas production and transport, hydrogen and materials, performance of corrosion inhibitors, flow influenced corrosion, electrochemical methods, corrosion monitoring

He is also the member of major German and international technical societies, Past-President of GfKORR (German Society for Corrosion Protection), NACE International, Past President of International Corrosion Council (ICC), Board Member of World Corrosion Organization (WCO)

He has been NACE Fellow (2005) and recipient of Rahmel-Schwenk-Medal (GfKOR/2006), European Corrosion Medal (EFC/2011); Lee Hsun Lecture Award (Chinese Academy of Science/2018), W.R. Whitney Award (NACE International/2020)