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Laurens van Gelderen[†], *Hamed Farmahini Farahani*[‡], *Grunde Jomaas*[†], *Ali S. Rangwala*[‡]

[†]*Department of Civil Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark*
[‡]*Department of Fire Protection Engineering, Worcester Polytechnic Institute, Worcester, MA 01609, USA*

Abstract
In order to improve the validity of small scale crude oil burning experiments, which seem to underestimate the burning efficiency obtained in larger scales, the gasification mechanism of crude oil was studied. Gasification models obtained from literature were used to make a set of predictions for relevant burning related parameters which were then compared to experimental results. These parameters, the surface temperature, mass loss rate, flame height and residue composition, were studied for three hydrocarbon liquids (*n*-octane, dodecane and hexadecane) and two crude oils (DUC and REBCO). Based on the models-experiments comparison, it was suggested that crude oil burns according to a distillation-like mechanism, with the light components burning off first, followed by increasingly heavier components as the burning progresses. Thus, in order for the crude oil to burn near 100%, the surface temperature must continuously increase to evaporate the heaviest components. Small scale experiments were deemed to lack a sufficient flame volume and resulting heat feedback to the fuel surface to reach such temperatures, thus explaining the lower burning efficiencies. Small scale experiments featuring an external heat source to simulate the larger fire size are currently in process.

Key-words: *in-situ* burning, burning efficiency, scaling.