## Personal details and contact info

| Title | Full Name |
|---|---|
| Miss | Kanokwan Buaprommart |

| UCL e-mail address | Role in the department |
|---|---|
| kanokwan.buaprommart.14@ucl.ac.uk | PhD Research Student<br>Academic Representative<br>CheERS Member |

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| 204 | +44(0)7472029764 |

## Education and awards

**Education:**

-BEng in Chemical Engineering, Thammasat University, Thailand, 2012
-BEng in Chemical Engineering, The University of Nottingham, 2014
-MSc in Chemical Process Engineering, UCL, 2015

**Awards:**

**Personal affiliations**

AMIChemE

## Bio

- 2017: Process Engineer, Gas Separation Plant, PTT Public Company Limited
- 2016: Assistant Researcher, the Energy Research Institution, Chulalongkorn University
- 2015-2017: Assistant to Senator, Thai National Legislative Assembly
  Secretary on the Energy Committee, Thai National Legislative Assembly

Kanokwan obtained her BEng in chemical engineering from Thammasat University and the University of Nottingham, receiving her MSc in chemical process engineering from UCL. Though studying MSc at UCL, she carried out research on the thermodynamic analysis of waste-to-energy plants: a comparative study between gasification and incineration.

Though working year, she worked on a number of government projects in Thailand including the project of investigating the efficiency of alternative energy in Krabi province reporting to the energy committee under Thai National Legislative Assembly as well as working as an assistant to the senator and as a secretary on the energy committee at the Thai parliament. Her responsibility is to analyse the trends in energy, particularly fossil fuel, electrical energy and alternative energy as well as to provide information on important energy technologies. She also worked as an assistant researcher at the Energy Research Institution, Chulalongkorn University where she had responsibility for conducting research on solar rooftop policy in Thailand and thermodynamic analysis of biomass gasification with $CO_2$ recycling loop. Following this, she joined PTT Public Company Limited as a process engineer at the PTT gas separation plant.

## Research interests

### Project title

PhD Modelling of jet-fire impinging on parallel high pressurised pipelines

### Summary


- Multiphase flow modelling
- Safety in the oil and gas industries

In the oil and gas industries, pipelines have gained significant popularity for transporting large quantities of highly flammable hydrocarbons under high-pressure condition. There are more than 2.3 million miles of natural gas and hazardous liquid pipelines operating in the United States. In the United Kingdom, more than 28,000 km of pressurised pipelines pass through both rural and populated areas. Although these pipelines supply substantial quantities of energy products to industry, the increasing use coupled with operation under extreme conditions have led to a significant rise in their failure. Controlled blowdown or depressurisation of pipeline is the common way to reduce the consequences associated with the risk. Nevertheless, the optimum depressurisation rate is concerned to allow the fastest evacuation rate without running the risk of a pipeline rupture. This is because the near adiabatic expansion process of blowdown phenomenon results in a drop of the temperature inside pipeline causing brittle wall fracture. Uncontrolled blowdown due to pipeline rupture poses significant hazards such as jet fire, jet fire impinging on objects and explosion. In case of fire impinging on a pipeline, the major hazard involving pressurised pipeline is a loss of mechanical integrity because of thermal loading at the pipe wall. The resulting temperature gradient and stresses within the pipeline wall are critical. Failure is assumed to occur when stresses in the pipeline wall exceed its ultimate tensile strength.
In pipeline transport, there is a potential of jet fire originated from pipeline rupture impinging on another pipeline since the parallel pipelines are frequently installed and operated over long distances. A release in one pipeline can seriously affect another one.

The research has focused on the development of a rigorous mathematical model involving heat-transfer, mass-transfer and thermodynamic processes to predict the failure mode of pressurised pipeline exposed to the localised jet fire that is originated from a nearby pipeline. The model is based on the resolution of the conservation equations using the method of characteristics. Accounting for real fluid behaviour, pipeline mechanic strength, phase and flow dependent transient heat transfer effects, and frictional pressure loss. The method of separation of variables for non-homogenous heat conduction across a pipeline wall is used to define the transient temperature gradient. Safety distances and failures of pressurised pipelines are studied.

Result

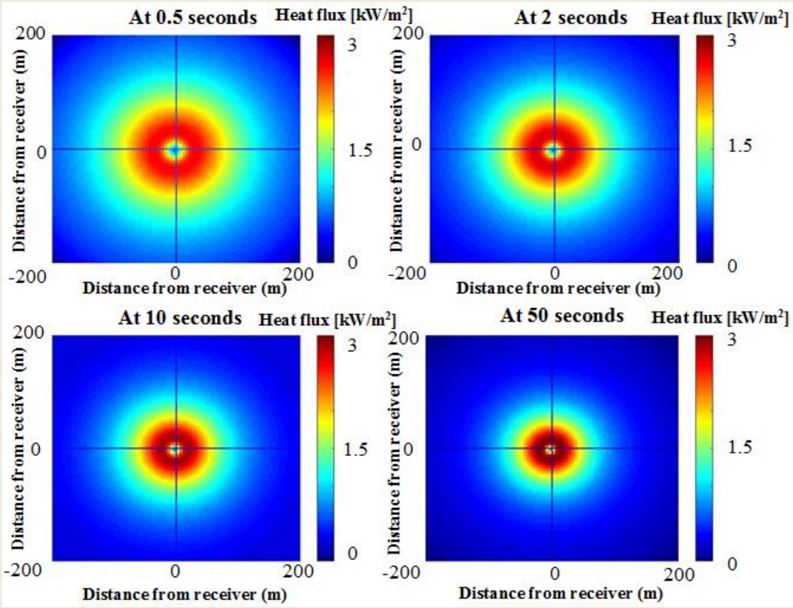


Figure 1. Incident heat flux contours at the ground level around vertical flame formed from the wellhead at (0;0), predicted at 0.5, 2, 10 and 50 s following blowout. Wind speed set to 0 m/s.

Figure 1 shows the incident heat flux radiation contours at the ground level for receiver distance of +/- 200 m from the jet flame at 0.5, 2, 10 and 50 s after well blowout. The results correspond to zero wind speed and 200 bar formation pressure. As expected the incident heat flux decreases with the distance from the centre of the jet whilst decaying with time, reaching its maximum of ca 3 $kW/m^2$.

**Supervisors**

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|---|---|
| 1. Professor Haroun Mahgerefteh | 2. Dr George Manos |

**Publications**

Buaprommart, K., Mahgerefteh, H., Martynov, S., Striolo, A. (2019). *Shale gas well blowout fire and explosion modelling. Applied Thermal Engineering, 149, 1061-1068*

## Teaching

Co-supervisor: MEng and MSc Chemical Engineering Research Project

## Research group

Professor Haroun Mahgerefteh’s group (Computational Fluid Dynamics)

## Additional information