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A simulation model to improve the energy efficiency of post combustion carbon capture process in coal power plant

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Carbon capture and storage (CCS) is considered as a promising option to reduce carbon dioxide (CO2) emissions by power plants that use fossil fuels. However, it consumes significant amount of energy raising the cost of power generation, hence CCS technology may not be a long term viable option for reducing CO2 emissions. Reducing energy penalty through process integration has significant importance for CCS adoption by the power generation industry.

Pinch technology is being used for process integration analysing overall process energy requirements to find economically optimal design. Exergy analysis, on the contrary, can reveal the major causes of thermodynamic imperfection of the processes and thus provides more insights for effective thermodynamic process design. Combining the strengths of both methods, this project will develop a simulation model to improve the process energy efficiency of post combustion carbon capture process in coal power plant.

A rotating parallel disc device for flow-accelerated corrosion research

Ian McNeilly, PhD candidate, PELM

In industry high fluid flow rates are a major cause of enhanced corrosion damage to exposed metal surfaces. With inherent difficulties in the monitoring of corrosion in plant environments, there is often a need to resort to small scale laboratory systems and attempt correlation of corrosion rates between the two systems by using conditions of similarity based on parameters such as mass transfer coefficients or wall shear rates. Currently available simple geometries include rotating electrode geometries such as the rotating disc electrode (RDE) and the rotating cylinder electrode (RCE). While hydrodynamic flow and mass transfer attributes remain well defined over a wide range of fluid velocities, these geometries are limited to modelling plant corrosion rates for comparatively mild flows up to a maximum shear rate of about 380 s-1. Industrial plant wall shear rates can be as high as 105 or 107 s-1 and other larger scale geometries such as the flow loop and the jet impingement cell are able to model turbulent plant flows