

# CEID RESEARCH: RECENT, CURRENT and FUTURE DIRECTION.

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Centre for Engineering and Industrial Design



## CIVIL ENGINEERING.

### Fibre Optic Distributed Temperature Sensing (FODTS) to Characterize Groundwater/Stream Interaction in New Zealand Hydrogeological Settings

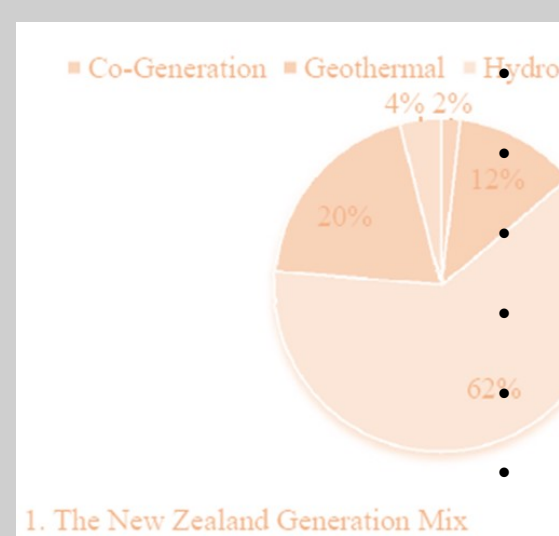
Maryam Moridnejad

New Zealand's groundwater resources are highly valuable but not well characterized. Management of groundwater resources requires information on groundwater direction and understanding the location and the amount of exchange with surface water. This study for the first time in New Zealand, investigated the applicability of fibre optic distributed temperature sensing (FODTS) technique in a range of rivers and streams located in different hydrogeological settings to characterize groundwater/surface water interaction.

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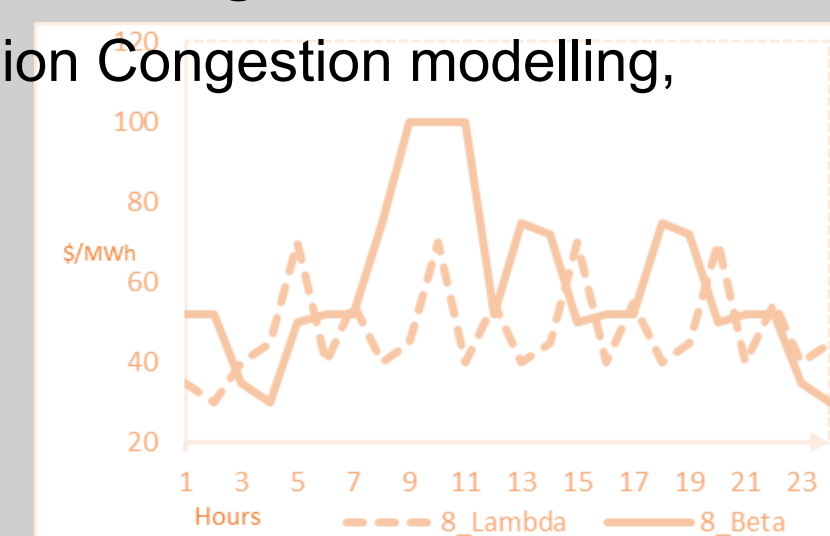
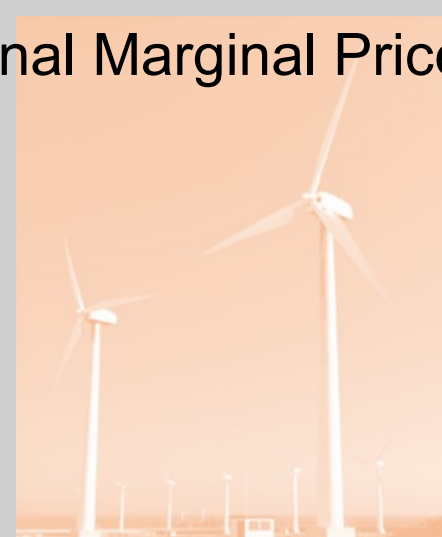
## ELECTRICAL ENGINEERING.

### Dr Bhujanga Chakrabarti is a senior Member of Institute of Electrical and Electronics Engineers



Optimisations in Electricity market - Locational Marginal Price, Line Loss and Transmission Congestion modelling,

- Optimal power flow
- Renewable Integration
- Wind-Hydro Optimisation
- Reactive power Compensation
- Transmission planning



## MECHANICAL ENGINEERING.

### Plasma Sprayed Titanium Coatings

Hong Zhou

Titanium and its alloys are often used as key materials for corrosion protection. A promising approach to optimize both mechanical properties and corrosion resistance is the use of coating technologies. Titanium coating assessment may include optical microscopy, scanning electron microscopy and microhardness testing. Use of a shroud and shroud gas flow leads to a significant reduction in coating porosity because of the reduction in air entrainment and better heating of the particles. Shrouded titanium coatings have a lower value of microhardness and a lower standard deviation than air plasma sprayed titanium coatings. Plasma spray processing of titanium feedstock becomes a challenging topic of research as titanium powder particles have to experience high temperatures in the flight during the thermal spraying process in an open air environment.

20.0kV 11.9mm x5.01k SEM-50 10.0um

Fig. 1. Schematic diagram of the coating formation process during TS. Redrawn from Ref 4

20.0kV 12.4mm x250 SEM-50 200um

## CLUSTERED RESEARCH AND COLLABORATION.

### An 'Industry connections and project based' research platform

Dr. Paul Ewart

As a teaching based tertiary institution with engineering programmes only at undergraduate level it exceptionally difficult to create new research directions that are supported by an adequate number of researchers. We have level six and level seven projects which are done on an annual basis and as the majority of these are driven by industry it could be the ideal platform with which to grow our research direction. In order to do this it is extremely important that we can collaborate across Wintec with those centres that have allied technologies or can support allied technologies. In CEID we have the capacity to create a small scale manufacturing unit that will support projects internal to CEID as well as the wider Wintec research base.

## FUNDING.

### Robust and successful applications.

Dr. Paul Ewart

The submission of funding applications can likewise benefit from the cluster approach where multidisciplinary teams from academia and industry are favoured over the individual institutional approach. There are also an array of international funding pools that are open to collaboration and the attraction of New Zealand very much in our favour with regard to exchange opportunities for both academics and researchers.

Feel free to contact me anytime you feel there is the opportunity to develop components or production processes for any devices or mechanisms for your research!



Figure 9: Lifting the profile of MIM and a clear message