企画セッション | その他セッション：JST

2016年9月8日(木) 13:00 ~ 14:30 | G会場 久留米シティプラザ スタジオ2

[PL2G] 文科省原子力研究開発事業について 廃炉国際共同研究を中心に

座長：樋口 真一（JST）

[PL2G01] 原子力競争的資金による研究開発事業の紹介

*住本 研一[1] (1.JST)

[PL2G02] 英日原子力国際共同研究の現状

*大野 真美子[1] (1.駐日英国大使館)

[PL2G03] Nuclear Research and Technology Transfer

UK Perspectives

*Simon M. Pimblott [1] (1.Univ. of Manchester)

[PL2G04] The UK's National Nuclear Laboratory Ltd (NNL)

'Needs Based' Research in the UK

*Keith Franklin[1] (1.NNL)

その他セッション「文科省原子力研究開発事業について 廃炉国際共同研究を中心に」

原子力競争的資金による研究開発事業の紹介

Outline of R&D programs for nuclear technology in competitive funds

*住本研一[1]

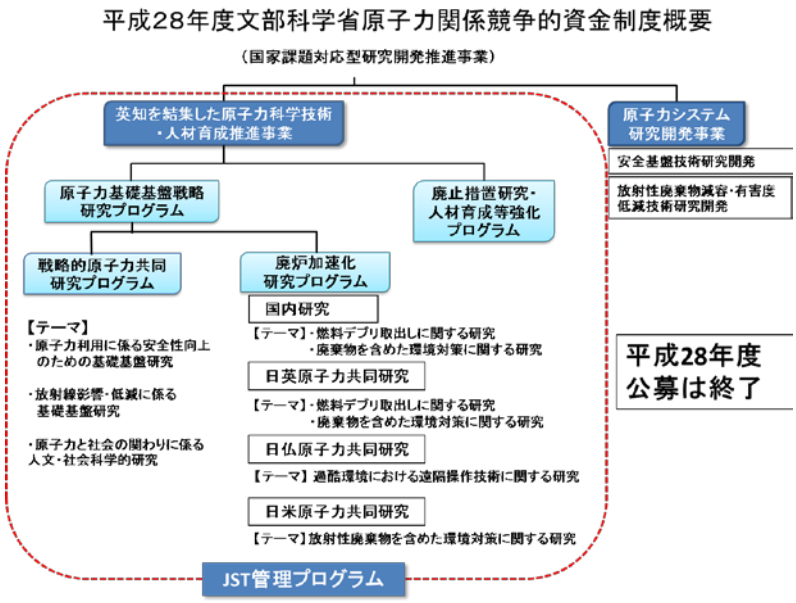
[1]国立研究開発法人 科学技術振興機構（JST）

文部科学省が進める「国家課題対応型研究開発推進事業」は、科学技術政策の遂行の観点から、国が直接実施する必要のある研究開発活動について、優れた提案を採択する競争的資金制度である。平成 20 年度に、原子力の新たな利用技術や知識の創出、技術基盤を強化することを目的として「原子力基礎基盤戦略研究イニシアティブ」が創設された。

福島第一原子力発電所（１F）事故後、「原子力基礎基盤戦略研究イニシアティブ」では「復興対策基礎基盤研究プログラム」を公募テーマに設定し、さらに平成 26 年度には新たに「廃止措置等基盤研究・人材育成プログラム」が創設された。平成 27 年度より、「原子力基礎基盤戦略研究イニシアティブ」「廃止措置等基盤研究・人材育成プログラム」が統合され「英知を結集した原子力科学技術・人材育成推進事業」（以下、「本事業」）が設けられた。本事業において、「戦略的原子力共同研究プログラム」「廃炉加速化研究プログラム」「廃止措置研究・人材育成等強化プログラム」を推進し、福島第一原子力発電所の廃止措置等を始めとした原子力分野の課題解決に貢献することとしている。具体的には、国内外の英知を結集し、国内の原子力分野のみならず様々な分野の知見や経験を、従前の機関や分野の壁を越え、国際共同も含めて緊密に融合・連携させることにより、原子力の課題解決に資する基礎的・基盤的研究や産学が連携した人材育成の取組を推進している。

JST は、本事業の支援業務を受託しており、「廃炉加速化研究プログラム」における日英、日仏、日米の国際共同研究を促進させる試み等を行っている。本大会では、英国大使館の協力を得て、英国の研究状況、英国からの参加者の研究紹介を行い、日英両国間の新しい共同研究・協力体制を生み出す一助とする。そのため、このセッションでは、講演以外に研究者間で自由に情報交換できる場を設ける予定である。

なお、最新の公募情報については、次の JST 原子力サイトを参照されたい。(http://www.jst.go.jp/nuclear/)



進行中・終了後の課題については JST サイト参照
www.jst.go.jp/nuclear/quick/index.html
www.jst.go.jp/nuclear/quick/end.html

*Kenichi Sumimoto[1]

[1]Japan Science and Technology Agency

その他セッション「文科省原子力研究開発事業について 廃炉国際共同研究を中心に」

Outline of MEXT competitive funds for nuclear technology
- International Collaboration on Decommissioning -

UK-Japan Nuclear Research and Programme

*Mamiko Ohno
British Embassy Tokyo

Background:

The UK and Japan have a long established co-operation in the field of civil nuclear energy, originating in the 1960s. The UK supplied Japan's first commercial nuclear power reactor, based on the Magnox design, which operated on the Tokai site from 1966-1998 generating in excess of 27.7 billion KWh. Nuclear fuel from this reactor, and later light water reactors in Japan, was reprocessed under contract to British Nuclear Fuels and its successors, from mid 1970s onwards. Following the Great East Japan Earthquake, on 11 March 2011, leading to partial melt down of three boiling water reactors at the Fukushima Daiichi site (Units 1-3), the UK and Japan have established a strong collaboration in the field of nuclear decommissioning and waste management. The Governments of UK and Japan recognise the importance of stronger collaboration and co-operation in the field of civil nuclear energy, to address the challenges of legacy decommissioning and waste management, and exploitation of nuclear fission technology as a safe, affordable, low carbon energy supply. Accordingly, a Japan – UK framework for Civil Nuclear Co-operation was established in 2012, leading to an annual UK – Japan Nuclear dialogue to strengthen bi-lateral co-operation in civil nuclear energy.

Overview of the EPSRC - MEXT joint research programme:

The overarching aim of this programme is: to advance

nurture the UK and Japan academic communities in civil nuclear energy, leading to the collaborative development of novel methodologies and tools, to address common challenges in decommissioning and waste management, reactor safety and regulation, nuclear energy policy, public communication and engagement, and environmental safety. The programme is in its third phase and running total of 6 projects under the themes of severe accident, environmental safety, removal of fuel debris, and waste management. An independent UK-Japan joint panel will meet at the end of August to assess the new proposals for 2016-2019. See below table for projects underway.

	Research Organisation	Grant Title
UK Partner	Imperial College London	Reactor core-structure re-location modelling for severe nuclear accidents
Japan Partner	University of Tokyo	
UK Partner	University of Birmingham	Novel restoration materials for clean-up of radionuclides in the environment
Japan Partner	JAEA	
UK Partner	University of Sheffield	Development of solidification technique with minimised water content for safe storage and disposal of secondary radioactive aqueous wastes in Fukushima
Japan Partner	JAEA	
UK Partner	University of Lancaster	Technology development to evaluate dose rate distribution in PCV and to search for fuel debris submerged in water
Japan Partner	Nagaoka University of Technology	
UK Partner	University of Sheffield Imperial College London	Advanced Waste Management Strategies for High Dose Spent Adsorbents
Japan Partner	Kyushu University	
UK Partner	University of Bristol	An ultrasonic measurement system and its robotic deployment into vessels for the combined assessment of debris condition and water leakage
Japan Partner	Tokyo Institute of Technology	

The session will briefly describe the main areas of nuclear research in the UK, and will identify opportunities for collaboration with international programmes.

For further information, please visit https://www.epsrc.ac.uk/research/ourportfolio/themes/energy/

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Outline of MEXT competitive funds for nuclear technology
- International Collaboration on Decommissioning -

Nuclear Research and Technology Transfer: UK Perspectives

*Simon M. Pimblott[1] and Christopher Pain[2]
[1]University of Manchester, Dalton Cumbrian Facility, [2]Imperial College London

The University of Manchester, Dalton Cumbrian Facility

The U.K. has a long history of nuclear power generation and with the development of an extensive new nuclear build programme on top of the requirement to decommission old facilities, there is a need for bespoke facilities to perform research to inform decision making. The University of Manchester's Dalton Cumbrian Facility is an undertaking supported by the Nuclear Decommissioning Authority and The University to address the engineering decommissioning and radiation scientific challenges associated with the nuclear industry and particularly the Sellafield site. The DCF is a world leading scientific capability located near Whitehaven in Cumbria close to the Sellafield site and was officially opened in 2013 by Lord Hutton. The facility currently houses state of the art irradiation capabilities, including a 5MV tandem accelerator; a 2.5MV single ended ion accelerator; and, self-contained Cobolt-60 gamma irradiator; as well as dedicated analytical chemistry and environmental and material science laboratories. The experimental capabilities will be described and discussed.

The ion accelerator systems at the DCF have been used to investigate the effects of various charged particles including protons, alpha particles and a number of heavier ions on nuclear and structural materials, while the Co-60 irradiator has been used to study the effects of gamma radiation on polymers and waste encapsulants, nuclear reprocessing solvents, LWR coolant systems, and atmospheric gases. Examples of work carried out at the facility will be presented to show how this equipment is used to enhance the mechanistic understanding of the deleterious effects of ionizing radiation in the nuclear industry, with applications include in waste storage and reprocessing as well as geological disposal and novel surveying techniques.

The DCF was originally supported by a £20million investment by the two founding partners, which has been leveraged by a further £6.5million of capital investment for research equipment raised from other government and industry sources. Capabilities under development include the world’s highest energy dual ion beam irradiation as well as a picosecond time resolution positron annihilation spectroscopy capability. The DCF, along with the National Nuclear Laboratory’s Central Laboratory and the Culham Centre for Fusion Energy, is an integral part of the UK’s National Nuclear User Facility. The NNUF was established as part of the Governments Nuclear Industry Strategy to provide the UK nuclear R&D community with access to world leading equipment for research on radioactive or activated materials. Future developments and enhancements at the DCF and the NNUF will be presented and important research challenges will be identified.

Imperial College London

The Applied Modelling and Computation Group (AMCG) at Imperial College London have maintained reactor physics and criticality innovation at a world class level that is unique to the UK. The AMCG achieved this by maintaining a strong

multidisciplinary team of mathematicians, physicists and engineers working in close contact with the Regulators and Industry. AMCG is a 50+ strong team of researchers that develops and applies novel numerical methods to multi-scale and multi-physics problems. In 2011, it was presented with the prestigious Imperial College Research Excellence Award. Our specific relevant expertise covers areas of radiation transport, reactor physics, uncertainty modelling, multi-phase flow, coupled nuclear/fluids/structures, fault modelling, computational fluid dynamics (CFD), nuclear waste repository criticality, finite element (FEM) formulations, solid-mechanics, scalable solvers and parallel mesh adaptation. The science is reinforced and further geared through working in other engineering and environmental fields. AMCG has worked and delivered on several industrial projects in collaboration with companies both within the UK and overseas. With Rolls-Royce it developed the EVENT radiation transport model and with the HSE the initial FETCH framework was built. In Japan, the AMCG worked closely with both the JAEA and University of Tokyo (UoT) in projects including the Todai Forum (a meeting of 50 UoT and ICL nuclear researchers held at ICL), fuel reprocessing and transient criticality. In addition, the AMCG has performed consultancy for JAEA. More recently, with the Babcock & Wilcox Company (USA), a predictive model for medical isotope production reactors was developed. Working with ONR the work on accident scenario analysis has been focused on a modelling approach for candling phenomena and its verifications and a recent EPSRC grant has helped develop the severe accident modelling framework.

その他セッション「文科省原子力研究開発事業について 廃炉国際共同研究を中心に」

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The UK's National Nuclear Laboratory Ltd (NNL)
'Needs Based' Research in the UK

*Dr Keith Franklin
National Nuclear Laboratory
First Secretary (Nuclear), British Embassy Tokyo

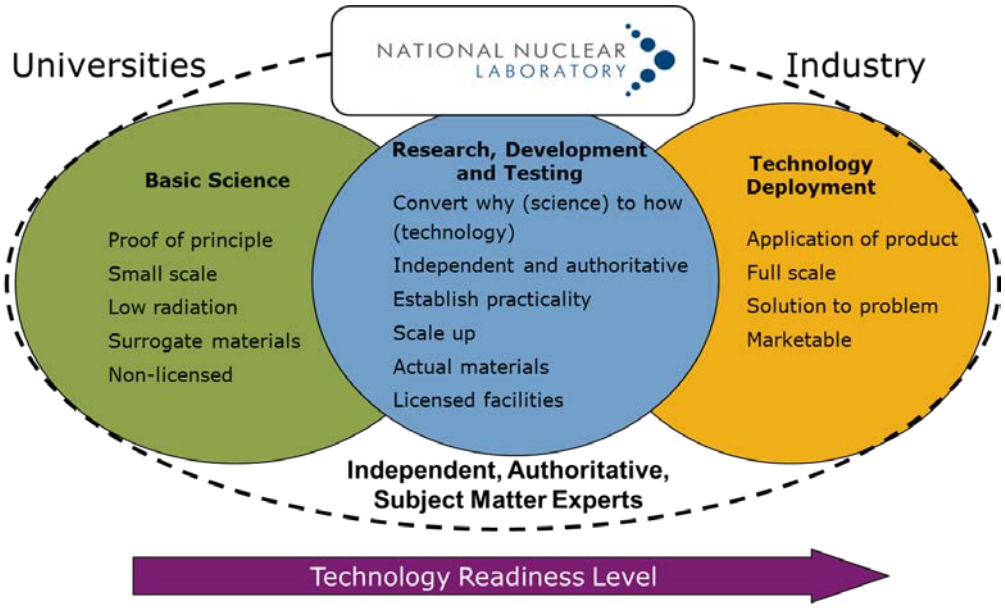
The UK's National Nuclear Laboratory (NNL) plays a central role in the co-ordination of UK nuclear research and development and maintains close links with academia and industry. NNL support Government in safeguarding the UK's nuclear skills and capabilities and provide advice on key strategic decisions (Figure 1).

Uniquely for a national lab, the NNL is an government owned company, and operate on a commercial basis. Customer-funded work is delivered with a strong commercial focus enabling NNL to generate an operating surplus that is subsequently re-invested in research, skill-building and facilities. This in turn helps to further the UK's strategic capabilities and develop expertise, thus supporting our Government mandate to develop and maintain a range of internationally recognised subject matter experts.

Figure 1: Linking Academia and Industry - The Role of NNL Ltd in the UK

This role allows the NNL to take technologies from low technology readiness levels up to pilot project and application in the industry (Figure 2). This means that the focus of NNL's work is on 'Needs Based' research, where advances in technology and linked with the needs of the industry to provide fit for purpose solutions (Figure 3).

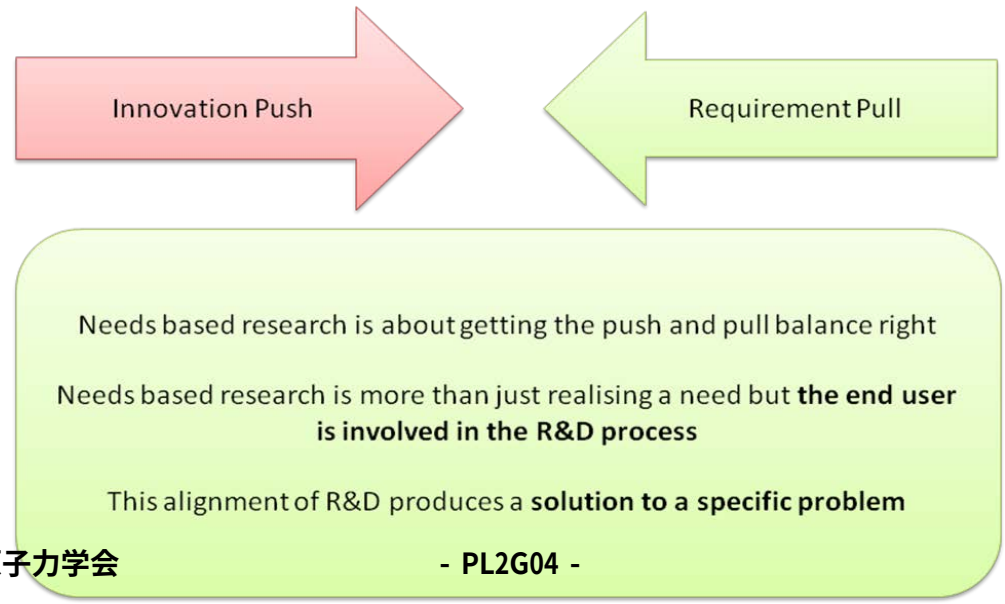
Figure 2: NNL - Linking Academia and Industry



This process, which uses the principles of 'innovation push' and 'requirement pull' drives the work of the NNL.

A large proportion of NNL's business is focused on waste management and decommissioning activities for Nuclear Decommissioning Authority owned sites and NNL has key facilities which are co-located on both the Springfields and Sellafield sites. At Sellafield, this co-location facilitates a specific emphasis on applied R&D to support and technically underpin the plants and processes on the site. A deep historic understanding of the site and its operations enables NNL to work in partnership with Sellafield Ltd to address even the most difficult of technical challenges. The Sellafield site is NDA's largest and most complex decommissioning challenge and therefore is a major focus of both the NDA and NNL's work.

Figure 3: Needs Based Research



NNL operates world class facilities ranging from inactive to highly active facilities. NNL operates a hot cell facility which supports the ongoing operations of nuclear power plants through post irradiation evaluation. This same facility supports decommissioning through characterisation and processing of highly active material including damaged fuel and fuel debris. This facility has been designed to accept a wide range of transport flasks making it one of the most flexible hot laboratories in the world with unique technical and operational experts at the helm.

Inactive and active laboratory scale work is performed through to full scale work. The operational ‘know-how’ from our full scale operations is harnessed and fed into the laboratory scale R&D programmes to provide practical solutions.