

Report of Korea Fast Reactor Information Communication

Period: 12/04 ~ 12/07

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Time lines

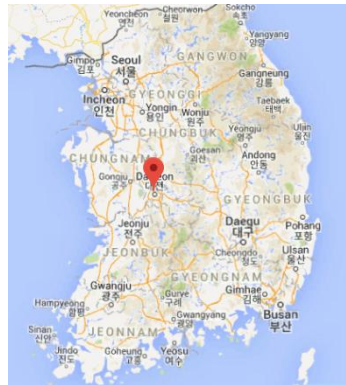
- 12/04: Sapporo ~ Seoul ~ Daejeon;
- 12/05: KAERI meeting(Daejeon), moved to Ulsan at night;
- 12/06: CORE Lab meeting, UNIST, Ulsan City;
- 12/07: Ulsan ~ Busan ~ Sapporo.

1. In Daejeon

(1) Introduction & trip feeling

Our first meeting at Daejeon, communicated with KAERI.

The full name is “Korea Atomic Energy Research Institute”, located in Daejeon.



(Fig.1 Daejeon)

Established in 1959 for nuclear power/technology research of ROK. For example, KAERI built the first multipurpose research reactor of ROK “HANARO” and the world’s first radio-pharmaceutical machine for treating liver cancer^[1].

Prof. Chiba and I arrived Seoul at 04th night and moved to Daejeon by KTX, the high speed railway transportation of ROK. There is no checking procedure in KTX station. This is new for me because in China there is serious ticket and security checking at railway station. Prof. Chiba told me this is “French way”. Because there is no checking in France too.

Mr. Kobayashi, our lab’s member who has internship at UNIST during that time, waited us at Daejeon and booked hotel for us. I am very grateful for his help.

Our Meeting with KEARI is in 05th morning, thus we had a nice dinner together, drank beer and makkoli(real name: Makgeolli^[2], a kind of alcohol in Korea). I have to say that makkoli is very delicious, tasted sweet, I like it. Oh, also the grilled pork chop, I like to eat it with Korean sweet chili sauce.

(2) KAERI meeting

During the meeting, several researchers used their precious time making presentations for us.

By this meeting, I know that KAERI has some co-operation work with Russian research institute: IPPE. For example, BFS series experiment. This series experiment aiming at neutronic characteristics of SFRs. And different type of experiments were established recently. BFS-76-1A

experiment is a mock-up experiment for TRU burner core, which is characterized by a blanket-free concept, low conversion ratio. This series experiment are prepared for KALIMER project.

One interesting thing for me is KEARI concerns about the axial expansion reactivity very much during this series experiment. I have to admit that this is the first time that I recognize the important of axial expansion reactivity/feedback. Actually, maybe my future work about new concept core design should concern about expansion too.

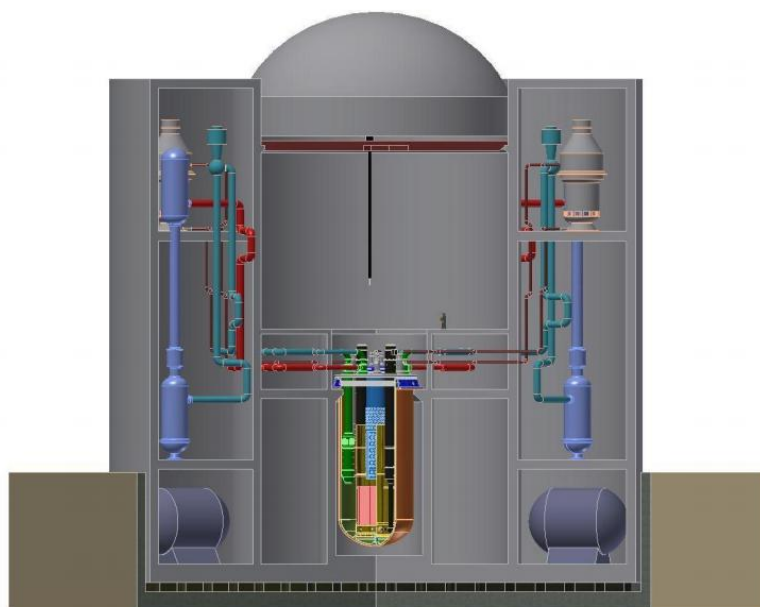
Generally Korea has a relatively liberal policy rather than Japan on nuclear power policy now. But not for fast reactor research. Korea government doesn't permit the reprocessing technology development. And doesn't want to build any reprocessing plant. They think highly of the risk of nuclear proliferation. Naturally the fast reactor development direction of ROK is TRU burning.

When we talking about the future of Korea's nuclear power development, KAERI's researchers shown worries about it.

Now PGSFR(Prototype Generation-IV Sodium-cooled Fast Reactor) is another important task for Korea on SFR research. It is a 400MWth, 150MWe advanced pool type sodium-cooled fast reactor that incorporates many innovative design features; in particular, metal fuel, which enables inherent safety characteristics^[3]. This work is co-operating with Argonne National Laboratory. More details please click [here](#) if you are interested in PGSFR^[4].

One more new thing for me is considering the cross section of fission production during core calculation, or k_{eff} would reduce rapidly in calculation.

PGSFR (KAERI, Korea)



(Fig.2 PGSFR schematic view)

2. Ulsan

(1) Introduction

UNIST(Ulsan National Institute of Science and Technology) is one of four public universities

in South Korea which are dedicated to research in science and technology^[5]. This is an international university aiming at industrial technology and science. All lectures are conducted in English which means convenient for receiving international students. Further more, this university has adequate funding due to industrial background. Doctor course is combined with master course generally.

Our mission for this trip is meet with CORE laboratory, UNIST. Prof. Lee's team is quite big because he has 2 research assistant professor(form China and Russia), 3 post doctoral members, and nearly 20 students. I have to say that they are nice people all.

Form my feeling, I think UNIST is good for students who do speak English fluently to accomplish PhD's education abroad (free tuition fee + salary, depends on actual lab's condition).

(2) UNIST meeting

During this meeting I roughly understood what is undergoing of Prof.Lee's team. Monte-Carlo is the main method of calculation at present. And they care about data processing quite much because the Russian assistant professor is an expert in data processing. He made one presentation about the technique of reducing group numbers of renascence region by something's vector(please forgive me). And I have to admit that I cannot understand the presentation of him. Very difficult for me.

Now CORE team is working on a concept design of small reactor which using for ship. I think this work has quite good potential for future ROK's industry. Long distance sailing and power supply of remote areas where near the sea could choose it as an option.

Actually, our trip in Ulsan is listening the final report about internship of Mr. Kobayashi. I think his presentation is nice, I can saw works he has done in UNIST about CEFR(Chinese Experimental Fast Reactor). I believe that there are something the same with my future work of benchmark problem analysis with CBZ.

3. Food & Drinking

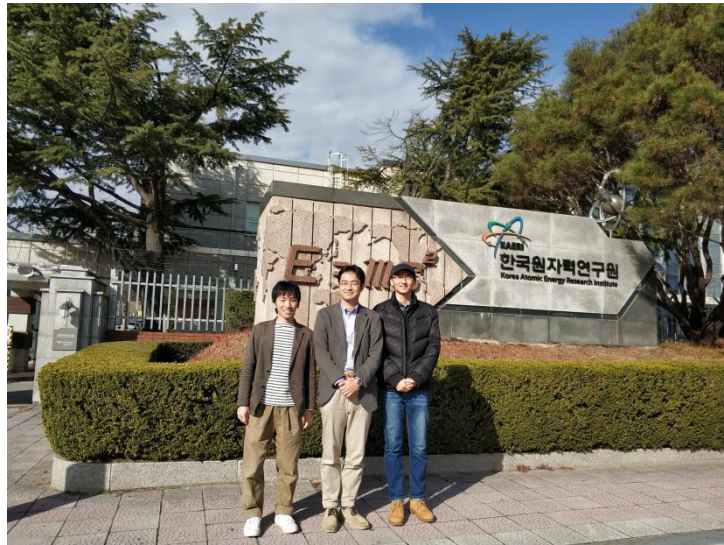
Okay, finally I finished writing the important part of my report after long description.

But I would like to think this part is more important.

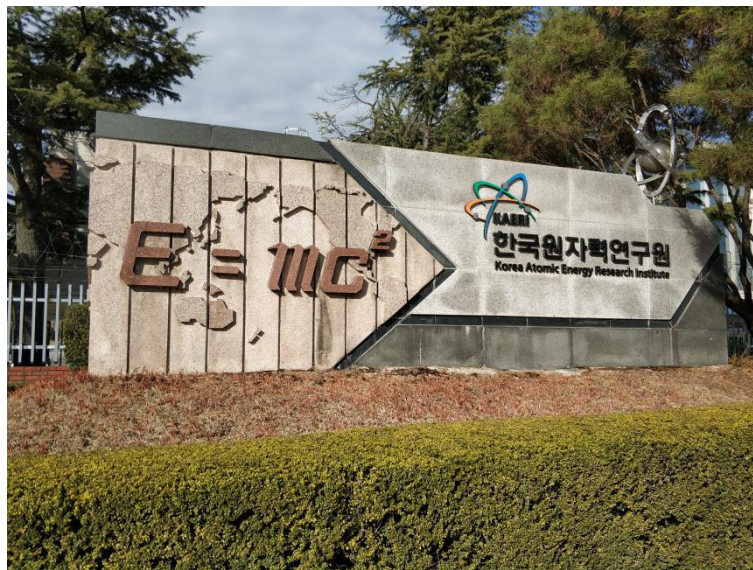
Speaking less, show pictures!



(This is our first meal in Korea. Yes, U R right, two plates of grilled pork. Here I want to say that sincerely thank Prof. Chiba. He is a generous man.)



(Here is the doorway of KAERI. Please ignore our funny face cuz the sunlight is too strong.)





(This is our second dinner in Korea. Thanks for generous Prof. Lee. He is a strong man in drinking. Actually I heard the chair man of KAERI's meeting spoke to Prof. Chiba that "Please hold yourself because you are going to meet with Prof. Lee. very interesting.)



(Photo after lunch. Thanks for generous Prof. Lee again. This lunch is traditional duck meet cuisine of Korea. Very delicious but I forgot to take a picture. What a pity!)



(Final meal of this trip. Of course, sincerely thank Prof. Lee. This is another special cuisine of Korea, grilled fat of cow. Smelling very good for me. And this is my first time to eat rare liver)

Each dinner we drink many liquid and felt happy (Professors had second party for drinking each day. I cannot hold that. I think Prof. Lee is a kind senior.)

Reference:

- [1] https://en.wikipedia.org/wiki/Korea_Atomic_Energy_Research_Institute
- [2] <https://en.wikipedia.org/wiki/Makgeolli>
- [3] <https://www.anl.gov/article/argonne-kaeri-to-develop-prototype-nuclear-reactor>
- [4] <https://aris.iaea.org/sites/..%5CPDF%5CPGSFR.pdf>
- [5] https://en.wikipedia.org/wiki/Ulsan_National_Institute_of_Science_and_Technology