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Useful concepts in magnetism, for supraconductivity and depleted uranium cleaning

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ABSTRACT

This short note is of interest for depleted uranium cleaning and supraconductivity studies. It presents ways to cleanse depleted uranium efficiently.

Keywords: Magnetism; Uranium cleaning; Supraconductivity studies

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An interesting introductory read is [1], where the author notes that « the common electromagnetic induction phenomenon is essentially a transmission and reception effect of electric waves. It is proved that the Ampere circuit law is derived from the displacement current, and that the displacement current is derived from the magnetic field, which is the electric field in motion ».

Criticities can happen with magnets (not to mention the particular case where a magnet is directed onto a critical nuclear core, the deformation can be enough to explode it). These criticities are not nuclear but explained by electron accumulation inside the free spaces of the nucleus. The break of potential barrier is not as energetically powerful. This is called metamagnetism.

The Kondo effect is the indication that supraconductivity can be achieved with actinides by feeding them with electrons. The « shuriken nature » [2] then becomes an excellent electron propagator. The e.g. UF6 molecules whose alpha polarity is entirely compensated (which is why depleted uranium, or even thorium 232, is obviously better) will be able to spin freely and the supplementary electrons will transit extremely fast. This phenomenon is homologous in nature to a nuclear criticity.

An explosion in a Huawei industrial plant signalled another experiment, which is the use of latent heat in actinide metals to have hot wires in smartphones, theoretically able to transfer signals more easily. Indeed the design requires lateral feeding with electrons of the cables. The simple use of hot actinide wires for signal transmission creates series of disturbances, deforms and diffracts the signals in many ways.

Image 1. The picture shows a fire involving a combination of non radioactive molten metals and of depleted uranium wiring added.

Supraconductivity with uranium wires can be achieved without cooling, thanks to the Kondo effect. In other words a tenuous rise in the increase of electricity spending allows much faster conduction, to the (social) condition that some monitoring is ensured.

In particular, the paradoxal effect is that cores with a high but still reasonable Keff (of 0,9>Keff>1) can be used to feed magnets linked with depleted uranium wiring to it. This is for instance excellent to clean depleted uranium dust. Indeed, with a cloud of depleted uranium, the alpha load in the motor core creates a repulsive effect that has to be eliminated, so, potentially, in this regard acute levels of fission may succeed purely in the task because fission is the best way to slowly reduce the positive load in the core while producing intense energy levels, and fission with relativistic neutrons (see earlier works of the author), if there still are anti squeezed impurities (see [3]) shall simply bring more depleted uranium onto the magnets, since usually the load to clean is tremendous. Metals with high rate of spontaneous fission such as Cf252 may however achieve this without even the need for going critical. Overload is tempting and can be efficient (with « pulsed » i.e. sodium cores, positive void coefficient - it is tempting to recommend sodium fast reactors pressed by soldiers on the back of a plane, on the model of the Iranian invention whose profile view is featured on the flag of the regime, where pressing from above in a light screw system allows for control, altogether with a short cooling loop plugged on a dynamo, as it allows some permanent control)[1]. The peculiarities of cloud transport and release demand preferentially the hand-held manutention of the core.

Another reactor, subcritical, is presented below, it can be of very essential value for planes carrying magnets as in the above, combining hand-held control and stability thanks to Fermionic condensation.

The point of the following theoretical proposal is producing electricity while reducing as much as possible the losses of energy. It relies on metal actinide rods, an exterior neutron source (with a mechanical press for manual managing by an operator), transuranic waste with high spontaneous fission rates, and a k_{eff}=0.35, uses a filling with 3/4 water, 1/4 air of the core, producing thanks to the limited chain reaction in the fuel, a lateral vapor jet expected to reach circa 330 degrees C before energy transfer into the wheel, whose strong resistance cools down the water flow trickling down under the level of 100 degrees C, preferably even much lower. The essential point is that the power of the magnets in the electricity generator have to be increased to move as much electrons as possible, so as to ensure the water transfers as much energy as possible while forcing its way through the wheel, without any additional heat exhaust, cooling tower. In case energy power is insufficient, on the other hand, the intensity of the alpha source can be readjusted, simply by adding more Am241 (for instance) together with the Be used for neutron spallation. The proposal also allows for additional loading with radioactive waste (short-lived) to conjugate with the fission of the fuel, to use β-particles or decay heat for more rapid start-up.

The purpose is first and foremost electricity production without heat loss radiating from the outer walls of the reactor – these outer walls should be cold. The staff hence is not exposed to any health issue during normal time. Adding further layers of tungsten carbide from the exterior could serve for keeping the core thermally efficient. The machine, at that time, produces electricity thanks to a subcritical fission chain reaction maintained by the α+Be source on a side, and by increase of pressure thanks to adds of radioactive waste whose heat, and emission of particles, contributes to increasing density and reducing criticity threshold of the fissile material as needed. Putting, in the middle of U_{235} – U_{233} – Pu_{239} rich rods some transuranic waste with high spontaneous fission rates is also essential. The reactor hence is pressured.

On the side of the α+Be source, a mechanical press is a simple solution to manage a primitive neutron flux produced by an α+Be combination ; increase in mechanical pressure brings the source closer to the

1One torn apart hand is to be reported in the story of accidents (an actual cleaner).

Be block and increases yield of the source. This is a simple substitute to a traditional accelerator.

The alpha source creates a neutron flux. Americium 241 would be the perfect alpha source. Inserted with a heavy leg standing on its side, along a beryllium incurved shape that produces a constant beam of neutrons. These neutrons go through a lingot of gold, essential as it ensures a good percolation of the neutrons while protecting the motor from leaks. Gold is essential and the investment of a heavy lingot is required.

However the fuel itself can be decided by adapting the water, more deuterium allowing the use of more depleted uranium (but this machine is not primarily intended as allowing high rates of non-thermal neutrons). Short-lived fission products can be also brought inside, using the machine to convert hot radioactive waste into a supplementary electricity source – bettering pressurization rate. This can be nevertheless substituted by using, for instance, transuranic waste and its heat.

It is proposed to use the fuel in metallic form, to facilitate the positioning in vertical holding with solely a holder (made of steel), to permit rapid collapse. The pressure of the water coming back from the wheel after energy transfer will also ensure the vertical holding of the fuel rods, and the dynamics of that water ensures that neutrons from fission in the rods are more likely to bounce back into the rod and maintain some chain reaction (the actual fission chain in the rod expected typically at k=0.35).

A thermoelectric generator is inserted above the area where the spinning energy of the reactor meets the transmission axis (also called „vapor chamber“ because of the limited entries of hot water), to ensure conversion of energy deperditions into a supplementary electricity flux.

The energy inside the core will press back onto the gold lingot and ensures it remains stable in spite of the temperature and of the press pushing on the other side the Am241 into the Be and into the gold lingot.

The power of the magnets in the electricity generators should be enough to ensure a strong resistance of the wheel, ensuring the water falls back cooled down. The water is expected to press the wheel in vapor phase and fall back afterward in liquid phase into the recipient where it is boiling.

The simple material for black pieces (in the depiction of the machine, Fig 1 below), the main bulk of the core, is proposed to be tungsten carbide, for its optimal synthesis of high hardness, low thermal conductivity (see [4]) and good neutron reflection. The wheel itself is of the same material. The cablewire for energy transfer is made with carefully framed stainless steel, using chromium and niobium alloying.

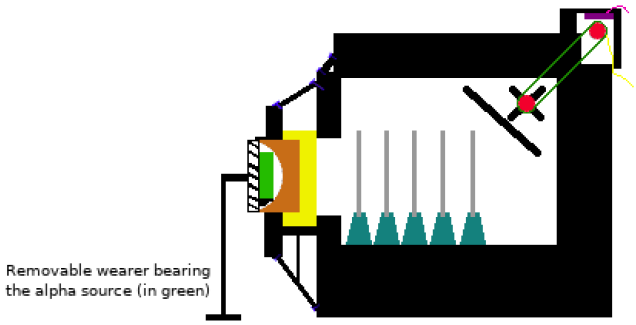

Fig 1. The entire design, side view, depicted without the water coolant. Supplementary radioactive waste would be laid on the floor in the right corner.

The vapor will accumulate and push progressively to the right the wheel, that cools down the vapor as the wheel advances, leading to fall down of the resulting water. A mechanical spin may have first to be given to the wheel to help the water ford the wheel and fall to the right, without seeping back to the left of the

wheel and weighing back (which would lead to a yoyo effect due to insufficient energy) – but an alternative is proposed, using fission products (or more transuranics).

As concerns the issue of the cablewire openings in the core, carefully carved holes, millimetrically, should allow for optimal passing of the cable while using the slight percolation of water as lubrifiant. The wheels should be mechanically set to spin clockwise – in the drawing presented. The cable collects the seepage of water trickling from the upper hole when returning, and lubrifying benefits as well from the condensed humidity. The thermoelectric generator (light pink) and the main generator (deep purple) inside the vapor chamber should be of course carefully coated with a thin rubber layer, and electric cables should as well be particularly waterproof.

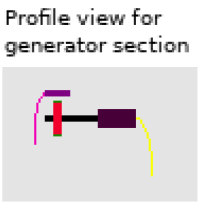

Fig 2. Vapor chamber

Hot riveting is used to bring the simple tungsten carbide blocks one with another (rivets are in blue in the figure 1). The bearer piece along the alpha source, depicted with rays to underline it, is *ductile* – a polymer material is needed – the removable wearer, the part on the far left before the polymer piece, is taken out just before starting the reactor and, instead, a mechanical press (not represented in Fig 1), with a corkscrew-like system for manual pressing (it should be controlled by a human directly and not given to a robot, no computer program should interfere to this task) is brought to push onto the polymer block, so to *inject* the Am241 piece (in green in Fig 1) onto the Be shaped charge (in brown), and the strength of the mechanical press can be increased to foster an increase in the neutron flow. The alpha source should be positioned while using a fan to extract air, using a small removable pipe, to avoid loss of energy of alpha particles before they hit the beryllium piece. The removal of the air will assure correct maintaining of the bearer against the beryllium piece when taking out the removable wearer.

As explained, to avoid yoyo effect and standing down without electricity production, at starting point of the nuclear machine, a clockwise momentum has to be given to the wheel to prop up rise to the good k, but short-lived fission products can also be deposited in the wheel‘s upper part, in powder form, to help, as an additional kick agent, for the early steps of rise to power, it will contribute to pressing the wheel but, of course, in the vapor chamber, a swab should have been tightly bound to the cablewire just at the top exit hole (closest to the thermoelectric generator) to avoid that the fission products bring back the wheel to the right and be useless[2]. They will instead be forced by the first vapor energy brought by the initial rate of fission in the core to contribute as well to spinning the wheel and start up the reactor. Transuranic waste, used instead, would be on the other hand deposited on the floor, directly, to simply increase pression on the rods until reach of k = 0.35. It will indeed increase density of the basic level of chain reaction as it creates an additional water flow in the direction of the rods. Also, the intensity of the alpha source in the chamber may be adapted to the abilities of the magnets in the generators, if high-

2 Immediately removed as the cable starts spinning – the swab is a metallic clothespin (pinch) taken off by the operator of the vapor chamber before hitting the reentry hole. Without that pinch the pile of fission products would be attracted to the left, however thanks to it, the simple pressure of low amounts of vapor tilts the balance and the electron attraction will mean that the pile of fission products pulls down the wheel, and when it falls down into the water it again increases the pressure onto the fuel rods, increasing fission yield, so the momentum of the wheel will then be enough to ford the gap without any supplementary help, the reactor has started.

quality magnets with rare earths are available, a more powerful alpha source can be inserted into the chamber after change of the magnets. The powerful mechanical spinning of the axis should be distributed into a long series of parallel coils (divided in 12 to 15) to ensure more efficient conversion of movement into multiple, separate electron flows, and, when needed, to adapt to the evolutions of the machine, change the magnets with high precision, without losing resistivity in the wheel and risking an increase in k above 0.35.

Alternatively to magnets, the movement of the axis could be directly kept as mechanical power for a small industrial production chain.

Not only this is an efficient fission reactor without energy losses [5], but the essential asset of the proposal is that it also conveniently allows for the recycling of all forms of radioactive waste into an electricity source, safe and reliable. The riveting system for tungsten carbide blocks allows relatively easy building of the main parts of the machine. The mix of uranium 233 / 235 / plutonium 239 / depleted uranium, plutonium 240, neptunium isotopes, and other transuranics of heavier mass, can be calculated to achieve the right subcriticity underwater and ensure a production of energy that allows no heat loss through the tungsten carbide walls.

The assertion is that the user will start with limited amounts of fissile fuel and open the core to add some more, rising very progressively, if the energy found is not enough to spin the wheel and ford the gap – practice onto a core, with actual fuel available, is better than any computer simulation and immediate relying on computer results. „Calculation“ is first about „economizing“ (as Ludwig von Mises defined the science of economics, first, as „economizing“), and here „economizing“ means starting low with fissile fuel and rising slowly. It is reminded the story of the Mars Climate Orbiter, a probe lost due to simple error in unit conversion during calculations.

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