

# South Africa's Apartheid Regime and its Path to the Proliferation of Nuclear Weapons

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## Introduction

In 1993, South African State President de Klerk disclosed its secret nuclear weapons program which was long being whispered about in the international media. According to the disclosure and the following IAEA inspection, the government developed and then in 1991 disassembled and discarded six and a half readily deployable nuclear weapons. South Africa's Afrikaner Nationalist government was in the final years of its four-decade reign, and the controversy over nuclear weapons helped defeat the government at the election box in 1994. The president claimed that the primary reason for the deployment of nuclear weapons was not actual use, but rather, "confidential indication of the deterrent capability" "to one or more major Powers", "in an attempt to persuade them to intervene" (de Klerk 1993, 4). Others remark that the reason was to upgrade country's technological capability, or that the Republic could test the nuclear weapon and thus show determination and deter the adversary. But, unfortunately, South Africa has disclosed only a very small number of administrative documents in this regard, and thus, the only reliable information we have is the State President's speech (Harris et al. 2004).

South Africa based its nuclear strategic thinking on the ideas of French military theorist André Beaufre. Beaufre founded his strategic theory on the Leninist strategy of revolutionary employment of propaganda and other non-traditional methods to achieve moral disintegration of the enemy with little military engagement. In his words, to achieve political goals, strategy must deploy "a whole gamut of means, both material and moral, ranging from nuclear bombardment to propaganda or a trade agreement" (Beaufre 1965, 24). He called such an approach "total strategy". Beaufre emphasized that total strategy is essentially an indirect strategy, which avoids direct military operations (Beaufre 1967, 112). He favoured military operations in cases when resources allowed for wars and large freedom of action, but he also mentioned that in modern conflicts, resources devoted to the military are rare, and therefore, strategies indirect. In his thought, the core of indirect strategy is deterrence, which aims at psychological dissuasion of the enemy (Beaufre 1967, 113). South

Africa borrowed the term “total strategy” from Beaufre. The development of nuclear weapons became an integral part of its “total strategy” of fighting with what they identified as African communism. Their nuclear strategy was, therefore, aimed at deterring the red scare from entering South Africa.

Several dubious points could be raised against the South African nuclear strategy, which aimed at a graduated exhibition the indigenous nuclear military capability. The first and foremost among those would be the claim that there was a logical inconsistency in its deterrent rationale. If the ultimate objective of nuclear deployment by the Apartheid regime was the survival of the South African republic vis-à-vis the “red onslaught”, and the strategy was to disclose its nuclear possession to the western countries to come to its aid, it was left with a serious inconsistency. It was like building “castles in the air” (Reiss 1995, 29). The only communist powers which possessed nuclear weapons were the Soviet Union and China. But Africa was far away from their core regions, and it would be illogical for them to escalate a conflict in Africa into a world nuclear war. Paradoxically, the heavy-handed anti-communist rhetoric of the Apartheid regime made it even more difficult convince friendly countries like UK or USA into coming to its defence. Building military alliance with the Apartheid regime was out of question, as it was denounced by their publics. Western military commitment in conventional warfare was not forthcoming, and it would be absurd for South Africa to coerce the West to provide a nuclear umbrella by a mere confidential disclosure of its concealed nuclear arsenal. Even more problematic would be South Africa’s implicit threats to provoke Soviet retaliation, and thus risk global escalation. Despite these risks, South Africa regarded its strategy viable. However, South Africa did have reasons to expect the West to react to its appeals. After all, this was the way the US Central Intelligence Agency (CIA) became involved in the Angolan conflict. The agency backed South Africa in its support to the anti-communist UNITA faction in Angola (Thomson 2015, SCUSPTA 1981). US covert involvement in the Angolan civil war helped South Africa in protecting the borders of Southwest Africa (today’s Namibia), which was South Africa’s colonial mandate amply criticized by the international community.

South African deviation from a standard logical reasoning have attracted substantial attention. Some, such as Pabian or Goodson call such strategy the philosophy of “catalytic deterrence”, where South Africa conceived of its nuclear bomb as a catalyst to gain extended deterrence from the West (Pabian 1995, Goodson 2012, Asuelime and Adekoye 2016, 127). Others, such as Betts argue that by disclosure or nuclear test, South Africa would use the nuclear threat in its foreign policy as a “diplomatic bomb” to persuade both the West

and the enemies (Betts 1980, 289). Others point at the South African logical inconsistency in a distinct way, by questioning its identification with the African continent. Hornton underlines that South Africa's nuclear appeal to USA and UK was based on its strong one-sided desire to identify with the West and with equally fierce dislike for the backward and rustic African continent. The republic wanted to get "Out of Africa" and become a true Occidental country, like UK or US, and this affinity was translated into its nuclear strategy (Horton 1999).

All three of the explanations bet on South Africa's affections for the West, and find the strategic rationale for the country's security perceptions in its pro-Western foreign policy. But they do not delve deeper, to the root causes of such affinities. This article argues, that the main explanatory hypothesis for South Africa's aberrant behaviour is in its obsession with conservation of external and internal racial order against the wave of decolonizations on the continent.

In the sections below, the article will review the process of South African nuclear development, focusing on the state's obsession with building of a nuclear capability easily convertible to military usage, and at the political context of decisions which lead to the development of nuclear weapons. Later it will review such decisions, focus at the Apartheid's understanding of sovereignty, nation or security, and suggest an alternative explanation for the atypical logic of the South African strategic concept.

## Nuclear Development in South Africa

South Africa's development of nuclear capabilities can be divided into two sectors, civilian and military. Since 1950s, nuclear development for civilian purposes had received ample international approval. International institutions, spearheaded by International Atomic Energy Agency (IAEA), provided a regulatory framework to support such development (Hecht 2006). However, this was conditioned by the fact that countries do not engage in research and development of devices designed for military use.

Military nuclear development is distinct from civilian development in many dimensions, but especially because it is not much concerned with costs. For example, construction of uranium enrichment facilities is very costly and low-enriched uranium for energy production can be procured on international markets. For manufacture of a nuclear weapon, highly enriched uranium is necessary. Trading with highly enriched uranium is tightly regulated, and thus it is not freely available on international markets. This raises

the aspirations for the construction of a domestic enrichment facility. Added to the research obstacles and exorbitant costs, domestic enrichment would soon raise brows around the globe. Thus, there are many deterrents to the domestication of nuclear production for military purposes. Military nuclear development has been discouraged and closely watched by multiple international agencies.

In spite of such deterrents, there have been high aspirations for the build-up of a nuclear potential which could be easily converted to military use. Those countries which do not have nuclear weapons but possess the technology or resources for their production, have been considered latent proliferators. After the WWII, Japan or Germany had the technological capacity, and South Africa had uranium resources, and thus they all fulfilled the criteria of latent nuclear weapons countries. Many latent proliferators have faced domestic temptations to build nuclear weapons. South Africa was among them since 1950 s, but it did not have either the technology or research capacity to develop ones.

## Civilian Development

South Africa is rich in mineral resources and uranium ore is one of them. Until the WWII uranium was discarded as a useless by-product of gold mining. After the WWII, it became one of the most sought-after strategic materials. Being part of the British Empire, South Africa's government started to survey its uranium deposits to aid US and UK nuclear weapons effort. In 1948, the government established Atomic Energy Board (AEB) which would supervise the program for development of uranium mining and production. The first uranium production plant was constructed in 1952. With the rising Cold War tensions, the demand for the ore was running high, and three years later, sixteen plants were in operation (van Wyk, A. 2018). In August 1955, the First UN Conference on the Peaceful Uses of Atomic Energy convened in Geneva, and upon its return, the South African delegation recommended that the country should train scientists to build an experimental reactor. In July 1957, South Africa signed a bilateral agreement with US on civilian uses of atomic energy, and joined IAEA, a newly established international organization to promote peaceful uses of nuclear energy and inhibit military proliferation. In late 1959, the Board established research program for training nuclear engineers, conduct surveys of technologies, and study on introduction of nuclear power to the electricity network. One major result of such researches was the survey of the process for heavy water production as a moderator in nuclear reactors (Albright and Sticker 2016, ch. 1).

The most substantial area of the national program was reactor research, and it was symbolized with the introduction in 1965 of a light-water cooled and highly enriched uranium research nuclear reactor from the USA (SAFARI-1 at Pelindaba). This was only the beginning, and AEB encouraged research into construction of an indigenous heavy water reactor cooled by sodium, which would not be dependent on the US supplies of uranium. The work on the indigenous reactor started in 1962, and provided scientists with much needed data and experience, and the chain reaction was achieved in 1967 (von Wielligh and von Wielligh-Steyn 2015, ch. 3). However, the development encountered many difficulties and by 1967 the scientists realized that energy produced by the indigenous reactor would be costlier than its alternatives. This did not mark the end of searching for ways of commercial nuclear power generation, as nearly ten years later, in 1976, the government initiated a construction project for nuclear power station in Koeberg near Cape Town supplied by US and France (Steyn et. al. 2005, 31, Fig 1998, 169). However, it was the end of indigenous power reactor research, as AEB cancelled the project, and its Reactor Development Division shifted its research interests elsewhere.

## Shifting Priorities

Power reactors were not the only sector that the research was conducted on. Among other areas, the interests soon shifted to the use of uranium for Peaceful Nuclear Explosives (PNEs). In early 1960s, US was engaged in “Operation Ploughshare”, which experimented with the employment of nuclear warheads in construction and mining industries. Development of PNEs attracted attention of the Atomic Energy Board, and especially the recently disfavoured Reactor Development Division. Soon, this became the second branch of the early atomic research in South Africa. At the time, usage of PNEs was becoming discredited around the world, because they were expensive, hard to control, created seismic waves damaging residential areas, posed risks of contamination, and faced extensive international criticism.

South Africa, moved in the opposite direction, towards the research on PNEs. In 1962, reactor scientist Wynand de Villiers brought a computer program AX-1 for computation of reactor safety from the United States. After his arrival he proposed that if adjusted, the program could be used for other calculations as well, such as nuclear explosions. AEB scientists manipulated it, and created a versatile PELX-1 program for such computations (von Wielligh and von Wielligh-Steyn 2015, ch. 3). The closing of the Pelinduna project was an op-

portunity to redirect scientific work in the Reactor Development Division (RDD) towards PNEs. Internationally, the pursuit of PNE research has not been outlawed, and the newly negotiated Nuclear Non-proliferation Treaty (NPT) provided a framework for PNE development while imposing strict conditions on states.

Notwithstanding the provisions for the PNE development, international concerns over South Africa’s nuclear research on the theme might spark a widespread backlash. To avert potential criticism, the government felt the need to conceal this new turn within the AEB’s former organizational structure. Therefore, new PNE research was conducted under the umbrella of the Reactor Development Division. As seen in Table 1, RDD’s “Theoretical Reactor Physics Group” computed yield calculations of nuclear explosives, “Theoretical Nuclear Physics Group” studied pre-detonation probability models for thermonuclear devices, “Experimental Reactor Physics Group” focused on instrumented low yield nuclear explosion measurements, “Reactor Engineering Group” engaged in designing explosion triggers, etc. As apparent from the compartment titles, almost all the groups were having relation to “reactor” research, but in reality, the “reactor” in their name provided an additional veil of secrecy to cover up their concentration on nuclear bomb research (Steyn et al. 2005, 37).

Table 1: Work Description within the Reactor Development Division, AEB

Organizational Unit	Work Description
Reactor Development Division	Nuclear explosives development research
Nuclear Engineering Group	Underground nuclear explosion mechanics
Theoretical Reactor Physics Group	Explosive yield calculations
Theoretical Nuclear Physics Group	Thermonuclear designs
Experimental Reactor Physics Group	Low yield nuclear explosion analysis
Reactor Engineering Group	Nuclear explosion Trigger designs
Electronic Engineering Group	Electronic equipment
Process Metallurgy Group	Conversion of enriched uranium from gas to metal
Physical Metallurgy Engineering Group	Melting, casting and processing of enriched uranium metal
Nuclear Chemistry Group	Production of thermonuclear materials

Source: Author, compiled on data from Steyn et al. 2005, 37.

The second area, which became emphasized in the national plan for research and development was enrichment. Having ample uranium deposits, South Africa sought to complete the cycle of uranium fuel production. This was consistent with its interests for indigenization of nuclear technology, and development of Highly Enriched Uranium (HEU) reactors. When the originator of South Africa’s national plan for nuclear research and devel-

opment, A. J. A. Roux presented his plan in 1958, one of his goals was to get access to often secretive Western technology, and then become independent of foreign, and especially American influence (Roux 1958, Hoagland 1977). Indigenous production was also a major goal of AEB engineers, who sought independence if not superiority over the Western production technologies. Introduction of an innovative and indigenous process in nuclear enrichment was one major area in which such techno-nationalist sentiments were realized (A. van Wyk 2010 a, 564, Edwards and Hecht 2010).

In June 1970, South African Prime Minister Vorster announced the construction of a new enrichment plant in Velindaba, which was in close vicinity to the Pelindaba research reactor. International control over enrichment was one of the main objectives of IAEA and newly introduced Nuclear Non-Proliferation Treaty (NPT) regime, accession to which was impressed upon latent nuclear states like Japan or South Africa (Wenger 2018, Baylis and Iwama 2019, Kurosaki 2019, Iwama 2019). Enrichment is a way to achieving self-sufficiency in uranium fuel for reactor power plants, which often need some level of enriched uranium to increase efficiency in energy productivity. Thus, pursuit of uranium enrichment could be justified on peaceful grounds, even if it raised suspicions abroad. However, enrichment is technologically challenging and needs large amount of electric energy. There are several methods of enrichment such as gaseous diffusion, electromagnetic separation or gas centrifuge, and technical knowledge about them has been considered a closely watched secret. South African nuclear engineers, headed by W. L. Grant came up with an indigenous gas turbine design, which was based on the West German Becker model that they obtained through cooperation with Germany (Cervenka and Rogers 1978). It was considered energy-inefficient and suboptimal to other designs, but enough to fit the needs for indigenous enrichment (Moore 1987, 86).

Nuclear enrichment was a crucial step, which linked the two facets of uranium-based nuclear development, reactors and power plant fuel production, and construction of a uranium bomb. The dual-use character of uranium enrichment, based on an indigenous technology with few strings of foreign supervision allowed South Africa to continue to disguise its aggressive intent behind peaceful assurances. Prime Minister Vorster insisted that South African design was intended only for peaceful purposes, but occasional comments by top engineers or his cabinet members eluded to South African technical capability to build the bomb (Albright 1994, Purkitt and Burgess 2005, 39, Hymans 2006, 206). A crucial turn occurred in April 1975, when Prime Minister Vorster announced that the core part of the enrichment plant was operational, and that they expected to produce about 6000 SWU/a



(separative work per annum) capacity, but that they were planning to build a commercial enrichment plant of about 1000 times more capacity within the next 10 years (Newby-Fraser 1979). This was announced at a time when the prices for uranium fuel experienced a slump, and thus it was difficult to secure buyers and enrichment contracts on the market. It also added to the suspicions that South Africa was willing to expand the enrichment process to serve other ends, such as highly enriched components for a bomb (Moore 1987). The suspicions continued as the South African regime carried on with the expansion of both the enrichment program, and of the Peaceful Nuclear Explosion device production. South Africa was soon ready for testing of its first “peaceful” Hiroshima-style gun-type nuclear explosive device, which was to take place in 1977 (Fig 2005, 49, Hoagland 1977).

## Military Takes Over

Full militarization of nuclear development arrived with the change in the government. In late 1977, a news leaked about the key members of the Vorster cabinet who were involved in misappropriation of public funds. The new cabinet was formed under the leadership of Vorster’s hard-line minister of defence P.W. Botha. Botha restructured the decision making on defence matters and established the Cabinet level Witvley Committee with relevant ministers and leaders of the Defence Force, defence industry (ARMSCOR), and Atomic Energy Board (O’Brien 2010). Botha also pushed through his “total strategy” based on the strategic thought of French general and military theorist André Beaufre. Total strategy considered the involvement of all sectors of political, economic and social life in achieving the military objective of countering the “total onslaught” on South Africa, and the build-up of more sophisticated arms in neighbouring states.

Based on the new strategic doctrine, the government developed a concept for the deterrent deployment of nuclear weapons in the three strategic phases mentioned in the introduction: 1) clandestine development of nuclear weapons, 2) revelation of the fact to the US and other Western countries, and 3) public disclosure or nuclear test. This was compounded with acceleration of its uranium enrichment process, and development of the second nuclear device for testing. In July 1979, Botha made a formal decision to build 7 deliverable nuclear weapons (von Wielligh and von Wielligh-Steyn 2015, ch.3 and Annex 6).

In September 1979, US military intelligence “Vela Hotel” satellites detected an atmospheric nuclear test-like flash around the South African Prince Edward Islands. The incident was attributed to the possible Israeli-South African tests (Kelley 2020, 16). The “Vela

incident” received considerable attention in the press, but neither South Africa nor Israel confirmed such allegations. However, the ambiguity over the tests and public attention they received, would suit the “strategic ambiguity” that Botha’s new deterrent concept and his “total strategy” envisaged. International pressure over South Africa’s nuclear intentions escalated with the enactment of UN sanctions and their adoption by the United States, which effectively meant stigmatizing South Africa as an outcast country with aberrant political system and nuclear proliferation intentions. What were the reasons for the development of weapons without any deep security rationale for their possession?

## Reasons for South African Proliferation

South African government invested 30 years and 600 million Rand (200 million USD) into a project, which had little justification, received severe criticism, and was scraped even before its existence was announced in 1990 s. But why did South Africa build the bomb in the first place then?

To answer that question, we must investigate the explanations the state offered about its defence. The rationale of the government was that nuclear weapons were the means of defending the “inviolability of state sovereignty”, and provision of security of its “sacred nation”. Minister of Defence and later Prime Minister and State President Botha said in 1975 in the parliament that:

We must not only have an adequate capability but also have it conspicuously so that it may serve both to deter and to repel those who may have designs on our country, its stability and its *sovereignty*. We would be foolish not to give our full support to these [*détente*] efforts, but equally foolish to allow ourselves to be lulled into a false sense of *security*, to neglect out military capability, and to be ultimately reduced to speaking from a position of weakness. (Hansard 1975, italics added by author; also in Miller 2016, 145, 153-154).

## Inviolable Sovereignty

South Africa’s concept of state sovereignty had two dimensions, external and internal. In external terms, South Africa counted on its territorial inviolability. South Africa occupied the southernmost tip of the African continent, where it built a Union in 1910, and declared republic in 1960. The boundaries of the Afrikaner and English states which joined

the union were demarcated and South Africa had no substantial territorial disputes with its neighbours. However, with its diamond and gold mines, South Africa soon became the wealthiest country on the continent. Since all borders in Africa are porous like a colander, South Africa's wealth generated a nearly constant and unstoppable flow of migrant workers from all corners of the continent (Klotz 2013). The country maintained a network of friendly relations with the neighbouring white colonial regimes, like those in Rhodesia, Portuguese Angola and Mozambique, which dampened migration from farther regions. Especially in the belt towards its northern borders, South Africa was keen to maintain a patron-client network of friendly regimes. In 1960s, a ceaseless wave of decolonizations, which started with Ghana and moved through Guinea, Mali, Belgian Congo, and others sent shockwaves to the Voerword's regime. To protect the country from what it saw as a "total onslaught" and return to barbarism, the Republic sought to establish a *cordon sanitaire* around its northern borders. Thus, its covert military support to the Portuguese regimes in Angola and Mozambique. The government committed itself firmly into a strategy of forward defence, which was epitomized by its open intervention in Angola and Rhodesia (Seegers 1996). Such a policy shifted later to more conciliatory stance, aiming at the prevention of communist or Marxist regimes. In 1970s it initiated the policy of constellation, which included countries such as Zambia, with which South Africa sought the policy of détente (Jaster 1980). However, South Africa had strict conditions. Its relations with the forward belt countries were epitomized by its position towards Namibia. Southwest Africa, as Namibia was called at the time, was a vestige of colonialism which South Africa inherited from the defeated German empire after the WWI, and became a League of Nations' mandate territory. South Africa pledged to ensure the road to independence, but instead, it claimed that Namibia was an integral part of South African territory and should officially become the fifth province of South Africa. Namibia was the clearest example of South Africa's claims to extended sovereignty around its northern frontiers. We might call it a policy of "outward Apartheid" (Bunting 1986, 430, Christie 1990, van Wyk, A. 2019, 159, Onslow 2009).

## Sacred Nation

Developing nuclear weapons means a total and ultimate commitment to protect the security of the people, by the people. South Africa had a very specific concept of peoplehood, or nationality (Bloomberg 1990, Bunting 1986). Since its conception, the country was

divided into four entities, two of them which belonged to the British (Cape and Natal), and two to the Afrikaners (Transvaal and Orange Free State). When in 1910 they merged into a Union, their relations were always strained, and for long they were dominated by the English. But most of the English elites had always had half of their hearts in the Imperial London more than in Africa, and thus, many preferred retaining their colonial links to the European suzerain. Afrikaners, who also came from the continent, did not share such allegiances. Afrikaners thought they belonged to Africa, they considered themselves an African nation (Giliomee 2003, Dubow 2014). It was their Nationalist Party, which preached strong attachment to Africa. After the WWII, in 1948, Afrikaner National Party superseded the pro-British United party, and gained majority in the parliament (Daniel 2009). Once in power, the Afrikaners held that majority for more than four decades (Posel 1992, Lijphart 1985, Mine 1996). National Party's nationalism knew no boundaries (Moodie 1975, Posel 2011). It was also Afrikaner type of racist ethno-nationalism, which could only be understood by white Calvinist Afrikaans speakers (Bloomberg 1990). Afrikaners recognized corporate autonomy (or sovereignty) of other peoples, like the English, Indians, Chinese, Zulu, Xhosa, Sotho, Tswana, Pedi, Venda and others, but they would never take them as the same with Afrikaners (O'Meara 1996).

This Afrikaner understanding of sacred nation paved the way to the wide-ranging domestic reforms, which were based on the tribalist concept of *volk*. Every people would have its *volk*, which was characterized by its language, customs, systems of education, economic resources and tribal patterns of governance. Every *volk* had its own stage of development, which was not to be disrupted, they call this the logic of "separate development". In its essence, it was based on the English colonial tradition of creating tribal reserves for those tribes which refused being "enlightened by modern ways of life" (Guelke 2005). What was different from the English colonial pattern was that Afrikaners put more emphasis on territorial autonomy of such nations, where individual belonging was determined not by individual choice but by origin (Giliomee 2003, Lodge 1983, Jaster 1988, McDonald 2009, Mine 2007). The system of territorial separation into gerrymandered tribal homelands called "Bantustans" was introduced in 1960 by sociologist and Prime Minister Verwoerd. There were two reasons for such retribalization. Firstly, this was a scheme which would enable the white colonial minority (in 1960 about 19% of the population, in 2011 8.9%) to stay in governmental and social domination. Dividing the overwhelming majority of indigenous population into about 8 autonomous Bantustans would split black peoples and allow the Afrikaner-defined order to persist (Thompson 2014). Secondly, it would ease the population

pressure on the republic. South Africa was constantly under the immigrant influx from other parts of Africa (Klotz 2013). Separating the country into territorial units, and stripping the indigenous population of citizenship outside of their *Bantustans* was a design which would ease the population pressure caused by the constant influx of “rustics, criminals, and insurgents”. This was the system of “inward Apartheid”, with which the Nationalists associated their understanding of the concept of “sacred nation”. It was a design to preserve the system of colonial domination in South Africa from the wave of decolonizations spreading like fire all around the continent.

## Conclusions

Between 1960 and 1990, the Apartheid regime in South Africa produced nearly 7 nuclear bombs in grave violation of its agreements and breach of international trust. Based on the ideas of strategic deterrence developed by the military, it designed the bombs to coerce Western countries, draw them into defence of its South African security interests, and to deter the “onslaught” of guerrilla tactics of the rising wave of African resistance movement. The rationality of its strategy has been disputed as it departed from the traditional thinking on strategic deterrence. South Africa’s thoughts on coercing the West were based on wishful thinking, and the country had no enemy which it could threaten with a possible deployment. The regime decided to build the weapons in order that it could protect the inviolable sovereignty and security of its sacred nation. However, its imaginations of sovereignty and inviolability were colonialist, racist and supremacist, and were contested in the process of anti-Apartheid decolonization. The “absolute” weapons were neither powerful enough to persuade the West to come and save the dwindling racist minority rule, nor were they threatening enough to deter the rising demands of the discriminated majority of the population. Despite all the Apartheid rhetoric, South African nuclear proliferation was not to promote the security of the country and its people, but rather to prolong the life of an illegitimate and rogue political elite, and protect the vestiges of the colonial rule it inherited from the previous centuries<sup>1</sup>.

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<sup>1</sup> This research was partially funded by JSPS research grants no. 21K18419, 18K01414, and Nagasaki University research funding.

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