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Iranian Military Capabilities and Possibility of Blocking Hormuz Strait by Iran

Zdolności militarne Iranu a możliwości zablokowania cieśniny Ormuz przez Iran

Keywords: Hormuz Strait, Iran, military strategy, Revolutionary Guards
Słowa kluczowe: Cieśnina Ormuz, Iran, strategia wojskowa, Gwardia Rewolucyjna

Abstract

Following official announcement of oil embargo on Iran by the EU, official positions of Islamic Republic were introduced by political and military authorities based on "blocking Hormuz Strait under certain circumstances"; an issue of great concern in western officials. They warned about their military capabilities in the field of reopening Strait and maintaining security of energy transit lines in the Strait of Hormuz. They questioned the West military methods against Iranian military officials reopening the Strait of Hormuz.This study seeks to answer this question that "what are Iranian military capabilities to block Hormuz Strait?", "If the Strait is blocked, when western military forces can reopen it?" "Iranian military capabilities which can be called 'five pillars of military strategy' based on cruise and ballistic anti-ship missiles, small speedboats, drones, small submarines, nautical mines and standoff missiles supported by air defense and electronic warfare (Jangal), allows Islamic Republic to

block Hormuz strait in long term. However, previous to any military conflict with trans-regional forces, the main Iranian weapon is nautical mines to block Hormuz Strait".

Streszczenie

Po oficjalnym ogłoszeniu przez UE embarga na ropę Iranu, władze polityczne i wojskowe przyjęły oficjalne stanowiska Republiki Islamskiej w oparciu o „blokowanie cieśniny Ormuz w określonych okolicznościach"; kwestia wielkiej troski zachodnich urzędników. Ostrzegali o swoich zdolnościach militarnych w zakresie ponownego otwarcia cieśniny i utrzymania bezpieczeństwa linii tranzytowych energii w Cieśninie Ormuz. Kwestionowali metody wojskowe Zachodu przeciwko irańskim urzędnikom wojskowym, którzy ponownie otworzyli cieśninę Ormuz. W badaniu tym starano się odpowiedzieć na pytanie: „Jakie są irańskie zdolności wojskowe do zablokowania cieśniny Ormuz?", „Jeśli cieśnina zostanie zablokowana, czy zachodnie siły zbrojne mogą ponownie ją otworzyć?". „Irańskie zdolności wojskowe, które można nazwać »pięcioma filarami strategii wojskowej«, opartymi na pociskach wycieczkowych i balistycznych przeciw okrętom, małych łodziach motorowych, dronach, małych łodziach podwodnych, minach morskich i pociskach dystansowych wspieranych przez obronę powietrzną i wojnę elektroniczną (Jangal), pozwalają Islamskiej Republice na długoterminowe blokowanie cieśniny Ormuz. Jednak przed jakimkolwiek konfliktem zbrojnym z siłami transregionalnymi główną bronią Iranu są miny morskie blokujące cieśninę Ormuz".

1. Introduction

Following announcement of Iranian military officials' threats based on blocking Hormuz Strait if Iranian vital interests are threatened, Iranian Navy drill began in Dey 3, 1390, as „Velayat 90" and ended in Dey 12. In Dey 6, 1390, coinciding the fourth day of naval military drill, „Mohammad Reza Rahimi" first Vice President said: „If sanctions are intensified against Iran, even a drop of oil will not pass through the Hormuz Strait"[1]. This statement has caused grave concern in global energy markets. However, some commanders of the Islamic Republic have previously threatened that they will block Hormuz Strait under certain circumstances; statements of the first Vice President, as the first senior political statement, globally reflected. Following these statements, diverse analyses were published.

[1] www.bbc.com/persian/iran/.../111227_l10_oil_ban_hormoz_closur.

For example:

– Commander "NAME Salami", Deputy Supreme Commander of Iranian Revolutionary Guards, said in 3 May 2016": If Iran is threatened, so we Close Strait of Hormuz"[2].
– Commander NAME "Tangsiri", Deputy commander of the Marine Corps of Iranian Revolutionary Guards,said in 23 July 2012:" If one day we realize that we can not use the entrance and exit of the Strait we will close the Strait of Hormuz"[3].
– Commander NAME "Firuzabadi", Chief of Staff of the Armed Forces of Iran, said in 7 July 2012: "If our interests threatened, so we have to close the Strait of Hormuz"[4].
– Commander NAME "Fadavi", Secretary of the Navy of Iranian Revolutionary Guards, said in 6 Feb 2011: "If we threatened we will close the Strait of Hormuz"[5].

Some analysts called Iran's threats as a media bluff. Referring to Iranian military capabilities, some analysts highlighted Iran's ability to realize its threats. Other groups referring to Iranian capabilities, reminded United States military and sensitive U.S. officials to ensure the security of energy flow.

In the Eighth day (Dey 10, 1390) of Navy drill, Hormuz Strait was blocked for 5 hours. In January 23, 2012 (Bahman 3, 1390), representatives of the European countries agreed upon sanctions against Iranian oil imports. According to this agreement, European countries needed to stop all new oil deals with Iran at that time; but oil imports from Iran needed to be cut up to six months later (early July). Following official announcement of these sanctions, although Iranian military officials' threats were not implemented due to some policy, these questions arose that „What are Iranian military capabilities to block Hormuz Strait?" and „if the Strait is blocked, when Western military forces can reopen the Strait?"

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[2] http://www.presstv.ir/DetailFa/2016/05/04/463859/us-Salami-threat-Iran-Hormuz.

[3] http://www.isna.ir/news/91050200985/%D8%A7%D9%8A%D8%B1%D8%A7%D9%86--%D8%AA%D8%A7-%D8%B2%D9%85%D8%A7%D9%86%D9%8A-%D9%83%D9%87--%D8%A7%D8%B2-%D8%AA%D9%86%DA%AF%D9%87-%D9%87%D8%B1%D9%85%D8%B2-%D8%A7%D8%B3%D8%AA%D9%81%D8%A7%D8%AF%D9%87-%D9%85%D9%8A-%D9%83%D9%86%D8%AF-%D8%A2%D9%86-%D8%B1%D8%A7-%D9%86%D9%85%D9%8A-%D8%A8%D9%86%D8%AF%D8%AF.

[4] http://www.humanrights-iran.ir/news-26255.aspx.

[5] http://www.mashreghnews.ir/fa/news/28339/%D9%81%D8%AF%D9%88%D9%8A-%D8%AF%D8%B1-%D8%B5%D9%88%D8%B1%D8%AA-%D8%AA%D9%87%D8%AF%D9%8A-%D8%AF-%D8%AA%D9%86%DA%AF%D9%87-%D9%87%D8%B1%D9%85%D8%B2-%D8%B1%D8%A7-%D9%85%D9%8A-%D8%A8%D9%86%D8%AF%D9%8A%D9%85.

2. Coordinates and Characteristics of Hormuz Strait

Hormuz Strait (geographical coordinates are northern 26° and 34' (26:34' N) and East 56° and 15' (56:15' E)) links Semi-enclosed Persian Gulf to Indian Ocean and international shipping lines by Oman Sea (Nami, 1389, p. 58). Geologically, Hormuz Strait has emerged due to advancing ocean through Sea of Oman on mild and posts of Zagros folds (Shahkar, 1372, p. 105).

Hormuz Strait is about 100 nautical miles or 182 km in length (Nami, 1382, p. 58); however, some resources have claimed 120 miles or 193 km (Haghshenass, 2008, p. 2), and others 280 km (Cordesman, 2012, p. 19).

Hormuz Strait is minimum 56 km and maximum 180 km in width (Malekzadeh, 1383, p. 40); some resources have claimed its most narrow part is 50 km in width and some others considered its minimum width as 21 nautical miles (Taheri Mousavi, 1387, p. 148). However, some resources reported 20.5 nautical miles or 38 km (Hafeznia, 1384, p. 163), some others reported 60 miles or 97 km in east edge and 24 miles or 38.4 km in west edge (Haghshenass, 2008, p. 2).

Other resources reported that: „Hormuz Strait is different in width across different regions, so that Great Ghueen Island and Lark Island are 38.9 km away from each other. While the distance from Nakhl-e Nakhoda in Iranian coast to the most north spot in Musandam Peninsula of Oman is 90 km. The distance from Ras Diba to Ras Al-Kooh is 96 km and it is 150 km from Bostaneh Port in hormozgan province in Iran to Dubai Port (Elahi, 1384, p. 57).

There are several islands within Hormuz area in different sizes including Gheshm, Lark, Hormuz, Abu Musa, Hengam, Small Tonb and Large Tonb under Iranian governance and small rock islands such as Alghanam, Ghueen and Almosandam under Omanian rule (Hafeznia, 1372, p. 75).

Hormuz Strait is 164 f (50 m) in depth (Haghshenass, 2008, p. 2). Water depth is 36 m along edges of Lark Island and it is 144 m in vicinity of Almosandam Island. The depth of Hormuz Strait increases from north to south and from west to east (Nami, 1389, p. 60).

The amount of salt has been measured 38–70 per thousand within Persian Gulf [PPM] and 60–200 per thousand within shallow areas (Hafeznia, 1384, p. 16). While, average salinity is 35 per thousand in ocean and salinity of Black Sea and Baltic Sea is 20 and 5–8 per thousand, respectively (Safavi,1380, p. 29).

Excessive water salt affects on transmission of sound waves; the more water salt, the faster sound waves are transmitted. Thus combination of high temperature and salinity of pathways toward Persian Gulf can facilitate tracking subma-

rines for ships located in the level with inactive SONAR[6] (Haghshenas, 2008, p. 14).

Vessels passing Hormuz Strait follow specific Traffic Separation Scheme (TSS). This program separates local traffic from external traffic to reduce accident risk. Traffic lane is 6 miles in width [9.6 km] including two 2-mile traffic lanes, an inbound and an outbound separated by a 2-mile buffer zone (Cordesman, 2012, p. 19).

3. Significance of Hormuz Strait

According to a Portuguese historian, seventeenth century AD, if the world was a gold ring, its jewel would be „Hormuz" (Najafi Asfad, 1369, p. 12).

Global oil production capacity in 2011 was 88 million barrels per day (bbl/d) of which more than half is transported by tankers located on ships. In 2011, on average 14 tankers carrying crude oil daily passed Hormuz Strait that this will be a lot including empty tankers entering the Strait. 85% export crude oil is loaded destining for Asian markets such as Japan, China, India and South Korea (U.S. Energy Information Administration, 2012: 1).

Table 1.
The amount of oil transit from Hormuz Strait

Location	2007	2008	2009	2010	2011
Strait of Hormuz	16.7	17.5	15.7	15.9	17.0

Source: http://www.eia.gov/countries/regions-topics.cfm?fips=WOTC.

4. Legal Status of Hormuz Strait and Persian Gulf

According to Iranian registered base lines and based on traffic sea separation (TSS) map of International Maritime Organization (IMO), approximately the northern third of sea route within Hormuz Strait and particularly a part of ship pathways from Oman to Persian Gulf is in Iranian territorial waters (http://irdiplomacy.ir/fa/page/18844).

[6] In fact, SONAR is acronym for an English phrase: Sound Navigation and Ranging. SONAR is a device to locate submarines by sending sound waves and receiving the echoes (Rostami, 1386, p. 507).

According to 1958 Geneva Convention on territorial Sea and supervision region and 1982 Jamaica Convention on sea laws, the part of Hormuz Strait and Persian Gulf located in territorial waters of Iran or Oman is subject to „innocent passage"; according to 1982 Jamaica Treaty, other parts (not included in territorial waters of countries) is subject to „transit passage".

However, according to Article 16 of 1958 Convention, innocent passage cannot be suspended by the coastal State (Dolatyar, 1372, p. 18). Thus, Islamic Republic can temporarily suspend innocent passage through specific areas of territorial sea according to laws provided that this is done to guarantee coastal security including attempts to military exercises and it is appropriately published in mass Media (Ziaei Bigdeli, 1386, pp. 329–330).

Warships including surface and sub-surface, armed or unarmed, supportive, troop carrier, and water-land ships belonged to other countries carrying flags and indicators distinguishing their nationality and mission are allowed to pass territorial water by agreements of that territory (Kazemi, 1368, pp. 83–84). According to Article 9 of Marine Areas Act of Islamic Republic of Iran in the Persian Gulf and Oman Sea Approved by IR's Parliament in 1372(1993), regulations on maritime regions, Iran considers innocent passage of martial vessels depended on previous agreement of Iranian authorities and some other countries apply 'previous permission' or 'previous notification' rules [The purpose is Iranian territorial waters, not all of the Persian Gulf] [Ensuring the implementation of legislation of IR's Parliament is the responsibility of the armed forces of the Islamic Republic Such as detention of US marines British marines in Iranian waters in 2016 and 2006] (Aghaei, 1374, p. 109). Based on current approach, Iranian military forces quest military vessels interring Hormuz Strait (within Iranian coastal boundaries) and foreign military ships answer these questions. It is worth noting that 'innocent passage' system applied in territorial waters does not include flight over them. According to Article 20, 1958 Convention, submarines passing through territorial waters need to constantly navigate on the surface showing their flag (Ziaei Bigdeli, 1386, p. 330). Additionally, 'flight, landing and transferring aircrafts and helicopters in any kind and other military facilities on vessels', which is prevalent in warships, violates innocent passage according to Article 19, 1982 Convention on sea laws (Dolatyar, 1372, p. 21).

Since 'transit passage' system is dominant on the part of Persian Gulf locating out of waters governed by Iran and other countries, blocking this part is not possible by any country; thus, according to provision A-1 Article 39, 1982 Convention on Sea Laws, 'transit need to pass continuously, fast and uninterruptedly.

According to same Article, Ships and aircraft, while exercising the right of transit passage, shall:

a) proceed without delay through or over the strait;
b) refrain from any threat or use of force against the sovereignty, territorial integrity or political independence of States bordering the strait, or in any other manner in violation of the principles of international law embodied in the Charter of the United Nations;
c) refrain from any activities other than those incident to their normal modes of continuous and expeditious transit unless rendered necessary by force majeure or by distress;
d) comply with other relevant provisions of this Part.

2. Ships in transit passage shall:

a) comply with generally accepted international regulations, procedures and practices for safety at sea, including the International Regulations for Preventing Collisions at Sea;
b) comply with generally accepted international regulations, procedures and practices for the prevention, reduction and control of pollution from ships.

3. Aircraft in transit passage shall:

a) observe the Rules of the Air established by the International Civil Aviation Organization as they apply to civil aircraft; state aircraft will normally comply with such safety measures and will at all times operate with due regard for the safety of navigation;
b) at all times monitor the radio frequency assigned by the competent internationally designated air traffic control authority or the appropriate international distress radio frequency. According to same Article any action by the ship or the aircraft threatening coastal state will suspend 'innocent passage' and coastal state will respond based on regulations related to the action (Hafeznia, 1384, p. 393). Moreover, Iran and Oman are allowed to monitor traffic and control commercial ships during war, if it is one of the parties of the war (Ziaei Bigdeli, 1386, pp. 389–390).

5. Iranian Military Facilities to Block Hormuz Strait

Iranian military facilities, called (Rezaei & taghavinejhad, 1390, p. 83) 'Iranian six-pillar military strategy in water' (esterategiye shesh sotoni) (PLEASE ADD HERE A PERSIAN NAME), include 'speedboats equipped with rocket', 'submarines equipped with torpedo and nautical mine', 'cruise and ballistic missiles

and anti-ship rockets', 'different nautical mines', 'aircrafts and drones equipped with anti-ship missiles' and 'common warship equipment including battleship and hovercraft' supported by air defense and electronic warfare[7].

During a maneuver conducted by American army, 2002, called 'millennium challenge', it was distinguished that American battleship was faced with serious damages encountering well-coordinated attacks by cruise and ballistic missiles as well as impact speedboats; this will results in a repeated (simulated) failure, as happened in 'Perl Harbor' port. During the maneuver, two blue including an aircraft carrier Combat Team and an aggressive water–land group and red teams including Extremist boats and launched ballistic and cruise missiles clashed offshore with each other. In the first 20 minutes, the blue team lost 16 buoyant (Abate, 2003, p. 3).

Speedboats which are the first pillar of Iranian military strategy in water cannot be tracked by radars of aircraft carriers and frigates due to their small sizes. The boats rapidly reach the considered place. Installation of equipment such as machine guns, missiles, rockets and torpedo on these boats gives them great military capabilities. Swarming of armed boats around larger vessels can cause great damages to the attacked target.

Washington Institute for Near East Policy report examined the most famous Iranian speedboats including Ashoura able to carry a heavy machine gun, a multiple rocket launch (MRL) or a contact nautical mine; Tarogh (Iranian copy of Swedish speedboat 'Boghammer'); Zoljanah or cruiser 'Bahman' able to carry torpedo and rocket launch site which can be used for mining missions within ship route in Persian Gulf; Azarakhsh and Zolfaghar (Iranian copy of Chinese boats of C14-class) able to carry 122 mm nautical MRL called HM23 with 16 rockets (about 20 km in range) able to carry two anti-ship missiles called Kosar; IPS-16 and IPS-18 boats able to launch 325 and 523 mm torpedo made in North Korean; Taedong-B and Taedong-C equipped with 324 mm light, low range torpedo (6–10 km in range) made in north Korean; Tondar (Iranian version of the ship 'Houdong' made in north Korean) equipped with twofold launcher of anti--ship missiles 'C-802'; and remote control boats with radar deco [able to deceive radars of enemies] or explosives-full boats to pervert defensive operations of enemies (Haghshenass, 2008, p. 12–13).

[7] Rezaii, N., & Taghavinejad, S. M. (1390). Eyalate Motahede va Iran Dar Taghabole Strategic: Abzarhaye Moghabeleye Iran Dar Jange Ehtemali [United State and Iran in a Strategic Conflict; Defensive Tools of Iran for a Potential War]. Tehran: Hormazd Press.

Table 2.
Naval Order of Battle

Class	Number in service
KILO	3
YONO (IS-120)	4
NAHANG	1
Swimmer Delivery Vehicle	8
GAHJAE	3
KAJAMI	3
ALVAND (VOSPER MK 5)	3
BAYANDOR (PF 103)	2
KAMAN (COMBATTANTE II)	14
TONDOR (HOUDONG)	10
C-14	9
MK 13	10
KAYVAN	3
PARVIN (PGM-71)	3
PEYKAAP II	25
PEYKAAP I	15
US MK III	10
TIR	10
US MK II	6
PASHE (MIG-G-1900)	10
GHAEM (MIG-S-1800)	6
MURCE (MIG-G-0900)	20
SEWART	3
MIL 40	2
MIL 55	1
TARLAN	15
KASHDOM II	10
ASHOORA I (MIG-G-0800	20
BOGHAMMER	30
Various Patrol Craft	8
LST	2
IRAN HORMUZ 21	2
HENGAM	4
KARBALA (MIG-S-3700)	2
IRAN HORMUZ 24	3
LIYAN 110	1
WELLINGTON (MK 4)	2
WELLINGTON (MK 5)	4
IRAN	1

Source: The Office Of Naval Intelligence, 2009, p. 15.

Additionally, there are boats called 'Seraj I (local example of 'Blade Runner')' and unmanned boat 'Ya mahdi' which are very efficient in asymmetric naval battles.

'Submarines equipped with torpedo and nautical mine' are considered as the second pillar of Iranian nautical strategy. Briefly speaking, Iranian submarine navy includes kilo class submarines (EKM Kilo-class 877) such as 'Tarogh 901', 'Noor 902', 'Younes 903'; Midjet 'Ghadir (IS-120)' class; Midjet 'Nahang' class; semi-heavy submarine 'Fateh' class; and Midjet compatible with humidity 'Sabehat 15' class and 'diving (local copy of Chariot)[8] (Cordesman and Wilner, 2012, pp. 116–119).

According to Military Balance 2016' The International Institute for Strategic Studies Iranian submarine navy includes 3 Taregh (RUS Paltus Type 877EKM) with 6 single 533mm torpedo tube, 1 Fateh, 16 Qadir with 2 single 533mm torpedo tube (additional vessels in build), 1 Nahang, 5 Al Sabehat (SF insertion and mine-layingcapacity) and 3 other submarines (The International Institute for Strategic Studies, 2016, p. 329).

These submarines are probably used for mining, special operations and anti-ship operations; they indicate Iranians' efforts to develop military abilities under the water (Haghshenass, 2008, p. 13).

'Ballistic and cruise missiles and anti-ship rockets' form the third pillar of Iranian nautical strategy. According to available resources, Iran owns anti-ship cruise missiles 'Kosar' (local copy of the missile C-701), Noor (local and optimized copy of C-802), Ghader, HY-2, Raad (local and developed copy of the missile HY-2), Nasr I (local copy of the missile C-704), Tondar, Yakhont SS-N-26 (called strobilus nato), Harpoon (AGM-84), FL-6, FL-10, anti-ship ballistic missile called 'Persian Gulf' and nautical rockets as Falagh II, Fajr III, Fajr V (Rezaii & Taghavinejad, 1390, p. 271).

The forth pillar of Iranian nautical strategy includes 'naval mines'. Naval mine is a war tool by strong explosives used in an almost constant place against ships including surface and submarines. These mines are installed in considered areas by aircraft, ship or helicopter. Anti-ship mines are made by steel in a spherical or egg-like form. They contain some air which maintains the mine floated on the water. Mines are exploded by contact with body of the ship. Performance and damages of these mines on ship depend on how it is constructed and the material used for the body. In fact, naval mines are considered as the most important and effective nautical war tools (Aghlmand, 1380, p. 98).

[8] Although both of them are called Swimmer Delivery Vehicles (SDVs).

There are three generalized categories of moored mines, Contact mines, Antenna mines and String mines. Contact mines are detonated when the ship strikes the mine. This bends horns on the outside of the mine, causing glass cylinders of acid inside the horns to break. This acid then ignites the detonator, either directly or by acting as an electrolyte for a battery. Other types of contact mines have used inertia switched but these proved to be very vulnerable to premature explosions. Contact mines have been fitted with many ingenious anti--sweep devices including explosive charges to cut sweeping wires and ratchet devices that enable a sweep wire to pass through the mooring cable without cutting it. Contact mines are practically restricted to the anti-ship role. the desirability of exploding a charge under a ship rather than in contact it has long been recognized. The first practical attempt at this was by the US in 1919. The antenna mine is moored on a short cable so it is a set distance under the surface. A long copper wire stretched upwards, terminating in a float. If any steel object touches the wire, anywhere along its length, an electrical potential is generated which detonates the mine. Antenna mines are particularly valuable in anti-submarine work since they can be set to sit deep in the water with their detonation antennas terminating a set depth under the surface. Thus, surface ships can sail over the wires in relative safety but submarines are in mortal danger. The problem with antenna mines is that the explosive charge has to be within about 100 feet of the hull of the submarine if significant damage is to be achieved. The chance of achieving this was greatly increased by the introduction of string mines. These feature tiers of charges which may be either contact or antenna fused. The explosion of one mine necessarily means the discharge of all due to sympathetic detonation. The whole assembly is incredibly clumsy, looks rather like a perverted Christmas tree and can effectively block water up to 800 feet deep. It is, therefore, exclusively an asset protection system but one which is very effective.

The mines as Russian MDM-6, Chinese EM-52, EM-55, EM-31, and EM-11 form the backbone of Iranian nautical mines. The Russian MDM-6 has a high explosive warhead weighing 1100 kg; within 12–120 m in depth, it has operational ability. Mine fuse is sensitive to acoustic (the sound caused by rotating propellers of buoyant while moving), compressive and magnetic effects and then it is exploded. This mine is installed by broad spectrum of Iranian systems including 533 mm torpedo launching channel of kilo class submarines and ships and speedboats. The Chinese mine EM-52 by a 300 kg warhead is able to fulfill its mission in 4.8-183 m in depth. This mine has an acoustic fuse. In relation to Iranian nautical mines, Iran can easily install these mines within ship routes, in

such a way that United States cannot track or transfer mines. In April 14, 1988 (Farvardin 26, 1367), an advanced American warship called 'USS Samuel B Roberts' meet the Iranian mine M-08 which was made during the World War I; the American warship was almost sunken (Cordesman and Wilner, 2012, pp. 129–130).

Production of the mine 'M-08' which is called Sadaf II in Iran dates back to 1908. This Russian mine is yet used in most countries due to its high capabilities. This mine is equipped with 115 kg explosives and contact explosion mechanism. The mine is comprised of five 5 Hz sensors in the upper hemisphere and a hydrostatic switch in the central part of upper hemisphere to face surface ship. This mine can be installed in maximum 110 m in depth (http://articles.janes.com/articles/Janes-Underwater-Warfare-Systems/M-08-RussianFederation.html).

The contact between the mine Sadaf-II and the body of American warship resulted in a 15*20 in (5 m) hole on the body of the warship. The powerhouse was totally covered by water and two gas turbines were broken. This much damage to warship structure results in sinking; however, sailors could save the warship. A day after, a non-military ship 'Hunter tug' carried the warship to Dubai in Arab Emirates (www.harpoondatabases.com/encyclopedia/Entry2120.aspx).

Airborne force is the fifth pillar of Iranian nautical strategy. Fighters and helicopters equipped with anti-ship missiles. Given that operational power of Iranian air force (army + Sepah) includes the fighters F-4 D/E (Phantom II), F-5 E/F (Tiger), F-14 A (Tomcat), Mig-29 A (Fulcrum), Su-24 M (Fencer), Su-25 (Frogfoot), Saeghe and Azarakhsh (Rezaii, 1387, pp. 90–91), Iranian Phantom, Fencer and Frogfoot as well as the helicopter Mi-17 (Mil-17) can attack ships located on Oman Sea, Persian Gulf and Hormuz Strait by anti-ship and standoff missiles. Meantime, some Iranian drones (remote guidable jumper) such as Karar can carry four Kosar anti-ship missiles, each 120 kg in weight (Rezaii & Taghavinejad, 1390, p. 243).

According to Military Balance 2016' The International Institute for Strategic Studies Iranian Fighters includes 20 F-5B Freedom Fighter; 55+ F-5E/F Tiger II; 24 F-7M Airguard; 43 F-14 Tomcat; 36 MiG-29A/U/UB Fulcrum; 64 F-4D/E Phantom II; 10 Mirage F-1E; 30 Su-24MK Fencer D; 7 Su-25K Frogfoot; 3 Su-25UBK Frogfoot (incl 4+ Su-25K/UBK deployed in Iraq; status unclear); 5 P-3MP Orion; 6+ RF-4E Phantom IIup to 6 Azarakhsh reported; up to 6 Saegheh reported (The International Institute for Strategic Studies, 2016, p. 330).

Finally the sixth pillar of Iranian nautical strategy includes warfare equipment such as frigate and hovercraft which are applicable in common asymmetric battles; obviously they are highly vulnerable during potential war with US as

'Jamaran battleship' and aircraft carriers BH7 and SRN6 (Tondar). Importance of Security in Persian Gulf for American Authorities

Eisenhower, the President of America at the time, 1951, claimed that 'Persian Gulf is strategically the most important area of the world' (Safataj, 1386, p. 25). This claim has been the backbone of geopolitical idea among American Presidents. Guaranteed constant oil flow to global markets in an appropriate price is considered as one of the vital interests of US in Middle East (Erkman, 1387, p. 27).

According to statistics of U.S. Energy Information Administration (EIA), in 2009 Persian Gulf has produced 27% global oil and other oil liquids (22.5 million barrels per day of 83.9 million barrels per day); this is predicted to reach 29% during 2015 (U.S. Energy Information Administration, 2011b, p. 229). Additionally, annual export volume of liquefied natural gas (LNG) in Qatar is 2 trillion cubic feet which forms 20% global trade of LNG totally crossing Hormuz Strait (ibid, 2012, p. 2). In relation to natural gas production of the region, Iran, Qatar and other countries within Middle East have produced 4.6, 3.2 and 6.6 trillion cubic feet, respectively, of totally 105.6 trillion cubic feet of global production (13.6%) in 2009; this is predicted to reach 5.7, 6.3 and 7.8 trillion cubic feet, respectively, of totally 123.6 trillion cubic feet of global production (16%) in 2015 (ibidem, 2011b, p. 50).

In 2010–2011, oil and other oil liquid consumption of America were 19192000 and 18877000 barrels per day, respectively. Import of oil and other oil liquids in 2010 and 2011 were 9435000 and 8432000 barrels per day, respectively, and the rest is provided through domestic production. That is, during these years 49.2 and 44.7%, respectively, of American domestic production were provided by import (ibidem, 2011a, p. 6). While, U.S. crude oil import from Persian Gulf countries during 2010 and 2011 were 1694000 and 1849000 barrels per day, respectively (http://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_epc0_im0_mbblpd_a.htm).

Thus, it is predicted that all U.S. navies provides facilities for the fifth navy located in Bahrain under vital conditions.

U.S. has five navies. Operational boundaries of the second navy extend in Atlantic Ocean between North Pole and South Pole from U.S. coasts to west coast of Europe. Generally, the second navy covers an area of more than 38 million square miles in length; its headquarters is in Norfolk. In February 1950, command of this navy was determined as the second navy command considered as a high command of American Atlantic Navy. The area under control of the third navy includes approximately 50 million square miles of the east, north and

center of Pacific Ocean; its headquarters is located in Purl Harbor. If a (potentially) great war occurs within Persian Gulf, the third navy is provided for American core navy command. Operational area of the fifth navy is Middle East (Red Sea, Arabic Sea and Persian Gulf) and Northern Indian Ocean and its headquarters is located in Manameh, Bahrain. Besides, American Navy owns offices in Kuwait, Arabia and Oman. It uses Jabal Ali Port, Dubai, to provide support and comfort for American buoyant units. Since Persian Gulf War, Navy Central Command is responsible. Operational area of the sixth navy is located in Mediterranean Sea and its headquarters is in Naples, Italy. During recent years, main forces of this navy have been in Persian Gulf. Operational area of the seventh navy is in the west Pacific Ocean and Indian Ocean and its headquarters is located in Yokosuka, Japan. It is worth noting that major forces of the fifth navy are rotationally located in Bahrain using Pacific Ocean navy (including the third and seventh navies) and or Atlantic navy. They generally include an aircraft carrier navy, a combat team, a standby land-water group, superficial buoyant, submarines, identifying aircrafts, nautical patrols and logistic ships (Ramezani Taklimi, 1387, pp. 328–340). Obviously, Middle East particularly Persian Gulf is strategically important for American authorities so that it is predicted that facilities of all navies are provided for the fifth navy located in Bahrain, if necessary.

Following threats of Iranian military authorities to block Hormuz Strait, if vital interests of Islamic Republic are threatened, USA established four aircraft carrier navies called 'USS Enterprise', 'USS Dwight D. Eisenhower', 'USS Abraham Lincoln' and 'USS John C. Stinson' within international waters of Persian Gulf. It is worth noting that U.S. owns 12 aircraft carrier navies in Kitty Hawk, Enterprise, John F. Kennedy, Nimitz, Eisenhower, Carl Winston, Theodor Roosevelt, Abraham Lincoln, George Washington, John C. Stinson, Harry S. Truman and Ronald Reagan class (ibidem, pp. 307–314).

6. Potential Scenarios

Tensions between Iran and the West leaded by U.S. related to sanctions and threats of Iran to block Hormuz Strait made possible several scenarios each followed by special assumptions and outcomes. Federation of American Scientists (FAS) and Center of Strategic and International Studies (CSIS) examined these potential scenarios through their reports.

FAS examined six scenarios and extracted their costs. These scenarios include: Scenario One: Increasing Pressure; Scenario Two: Isolation and Blockade

of Persian Gulf; Scenario Three: Surgical Strikes; Scenario Four: Comprehensive Bombing Campaign; Scenario Five: Full-Scale Invasion; Scenario Six: De-escalation.

The elicitation revealed the rough effects of U.S. action against Iran on the global economy– measured only in the first three months of actualization – to range from a net global economic benefit of approximately $60 billion on one end of the scale and total losses of $1.7 trillion to the world economy on the other end. The elicitation's six hypothetical scenarios involve U.S.-led actions taken with regard to Iran, along with the elicitation-derived average mid-point of cost for each to the global economy follow. Note that Scenario 6 is a de-escalatory stratagem and its three-month effects on the global economy are a net benefit as opposed to a cost. Note also that these costs represent estimates of net impacts on the global economy and average out the gains and losses to individual national economies. Extreme caution should thus be exercised in attempting to extrapolate these findings to particular countries or sectors.

1. Increasing Pressure: The United States opts to impose a new round of sanctions that penalize any foreign banks – public and private – that conduct transactions with any business with the Central Bank of Iran.
   - Average estimated global economic costs: Approximately US$64 billion.
2. Isolation and Persian Gulf Blockade: Among other actions, the United States moves to curtail any exports of refined oil products, natural gas, energy equipment, and services from Iran. Investments in Iran's energy sector are banned worldwide.
   - Average estimated global economic costs: Approximately US$325 billion.
3. Surgical Strikes: The U.S. leads a limited air and Special Forces campaign of "surgical strikes" on nuclear facilities and military installations that are of acute concern.
   - Average estimated global economic costs: Approximately US$713 billion.
4. Comprehensive Bombing Campaign: The United States leads an ambitious air campaign that targets not only the nuclear facilities of concern but also seeks to limit Iran's ability to retaliate by targeting its other military assets.
   - Average estimated global economic costs: Approximately US$1.2 trillion.
5. Full-Scale Invasion: The United States resolves to invade, occupy, and disarm Iran.
   - Average estimated global economic costs: Approximately US$1.7 trillion.

6. De-Escalation: The president experiments with a new approach to resolving the standoff with Iran by unilaterally taking steps to show that the United States is willing to make concessions.
   - Average estimated global economic benefit: Approximately US$60 billion.

Briefly speaking, America, through first scenario, imposes new sanctions on Iran where new penalties are imposed on those banks financially interacting with Iran. Also, insurant sanctions are imposed in order to isolate all Iranian energy units from global economics. Global costs of this scenario is estimated on average 63944409821 US$ in three months.

Through the second scenario, US move to cut off Iranian exports of oil products, natural gas, energy equipments and services. Investments on Iranian energy unit are forbidden. Commercial credit guarantee of Iranian authorities is cast off. Lending and investment in Iran is banned. Insurance and Reinsurance of marine transportation to and from Iran is banned. Major part of U.S. military strength is used in Persian Gulf to block unauthorized shipments to and from Iran and to protect oil and other product shipments through Hormuz Strait. Global costs of this scenario is estimated to be 325,369,730,268 US$, on average, in three months. through third scenario, U.S. lead limited air special forces attacks to Iranian military and nuclear facilities. These locations include facilities considered in the recent report by International Atomic Energy Agency (IAEA) and possibly up to three other places which have been classified in reports. In this procedure, a rapid and wide spread of crisis is avoided. United States relies on accuracy, speed and hiding and it deliberately does not target Iranian military assets; because this will lead to tackle of Iran. This scenario is expected to result in the loss of several planes and commandos. Global costs of this scenario is estimated to be 713,367,622,292 US$, on average, in three months (All According to Federation of American Scientist's Article (BLAIR and JANSSON, 2012, p. 15–20)).

Global costs of the fourth and the fifth scenarios are estimated to be on average 1,082,717,808,750 and 1,724,232,463,393 US$, respectively, in three months. Benefit (negative cost) of the sixth scenario is calculated at 57,163,613,100 USD in three months (BLAIR and JANSSON, 2012, p. 15–20).

CSIS examined three scenarios: Scenario 1: Sanctions but No Attack; Scenario 2: US Naval Blockade and Panic in the Oil Markets; Scenario 3: War.

The second scenario explains: 'Iran responds to new UN and USA sanctions, beginning a series of low-level attacks on Persian Gulf shipping by Iranian naval forces of Sepah Pasdaran and Intelligence ministry and extremist elements in Iraq and Lebanon to conduct operations against American targets. U.S. responds

to these actions by naval embargo of Iran and a no-fly zone over Persian Gulf. Iran installs limited number of smart sea mines near Hormuz Strait and Sea of Oman. Navy of Sepah Pasdaran irregularly attacks tankers by its speedboats to totally disperse them from Persian Gulf. Iran also installs smart mines and floating mines in the Persian Gulf and releases oil in the waters. Although these efforts will not lead to blockade of Persian Gulf, it will cause panic in the world markets for oil and shipping in the region. Panic maximizes when Iran targets a British destroyer coming to Persian Gulf to support U.S. navy by anti-ship missiles deployed in the coast. Finally, ceasefire was established mediated by Turkey after 10 days. This does not change main military situation and bring a halt to Iranian proliferation or missile developments (Cordesman, 2012, p. 13).

However the main scenario may be mining Hormuz Strait and Persian Gulf (in the Iranian territorial waters). As Cordesman claims that a no-fly zone need to be created within Persian Gulf as it is predicted through second scenario, in fact Cordesman introduces major Iranian Air Defense Systems through another report published in CSIS, as follows: Hawk I, Sam 5 (S-200), Sam 2 (Guideline), Sam 16/14/7, Sam 15 (Tor-M1), Sam 22 (Pantsyr- M), HQ-7, HN-5, Rapier, Tigercat, Stinger (FIM-92A), FM-80 and Misagh (QW-1) (Cordesman and Wilner, 2012, p. 48).

A closer look at Iranian air defense systems reveals that Iranian air defense systems can include Hawk (MIM-23), Mersad (optimized model of Hawk with the missiles Shaheen and Shalamcheh), Rapier, Shahab-e-Sagheb (based on systems of FM-80), Sayyad (based on the Chinese system of Hq-2), Sam 2 (Guideline), Sam 5 (S. 200), Sam 6 (Gainful), Sam 15 (tour – M1), Sam 22 (Pantsier) and HQ-10 (chinese model of S-300). Sam 14 (Sterla-3), Sam 16 (Igla-1), Sam 18 (Igla Graws), Misagh 1 and 2 and the anti-helicopter missile 'Ghaem' are considered as Iranian man-portable defensive systems. Additionally, Iran uses air guns of various calibers in its last defensive layer to destroy the short-range targets (Rezaii & Taghavinejad, 1390, p. 243).

Obviously, owning these improved systems which are capable of resisting against enemy's electronic warfare and can shoot aerial targets of high, average and low height, Iran can well protect its sky.

7. Minesweeping

US can at least use four mine-sweeper ships, many mine-sweeper helicopters and unmanned underwater vehicles for minesweeping operations. Saudi Arabia Navy owns four old American mine sweeper ships called MSC-322 (Class Addriyah) and three modern mine sweeper ships made in Great Britain called Sandown (Class Al-Jawf). Southern Gulf states Navies have also several mine-sweeper helicopters (Cordesman and Wilner, 2012, p. 130). By issuing a statement in June 25, 2012 (Tir 5, 1391), U.S. navy announced the arrival of four mine sweeper ships called MCM to Persian Gulf to strengthen the presence of American navy in the region and ensure the security of transport in water routes of Persian Gulf (http://www.khabaronline.ir/detail/223236).

It is worth noting that Western military efforts in order to minesweeping operation are successful when installation of mines is not repeated by military forces of Islamic Republic of Iran; this is a key point mentioned in the report of Washington Institute for Near East Policy.

Although mining operation is noisiness, to counter this tactic is difficult when the mines are installed; because minesweeping operations are time consuming and expensive and may be ineffective additional efforts. During military conflicts, 1987–1988, Iran could escape detection by enemy in most cases using the small mining boats 'Ashura'. During installation of 12 mines along 'Bridgeton', the boats of Sepah deployed in the base of Farsi island were in visual range of U.S. Navy escort ships. Mining operations can be directed using a variety of ships and boats, such as non-military boats including launches and cargo ships, as happened in 1987 for the ship „Iran Ajr". The operation can be repeated, if necessary, to frustrate efforts of enemies for minesweeping (Haghshenass, 2008, p. 8).

Given the technical aspect of minesweeping operations, it is worth noting that in a nautical mine with magnetic fuse, there is a magnetic needle which is influenced when the ship passes over and the mine comes to the surface and then it is exploded. There are two methods to frustrate mines:

a) A strong magnet is suspended by wire cables underneath the plane or helicopter moving near the water surface. The strong magnet affects on the mines and neutralizes them. Sometimes a circular wire cable is floated on the water surface and a current is passed through it; under influence of this magnetic field or flow mechanism, the mines are operated and exploded without any damage.

b) insulated wire loops are attached to the ship, and then a current is passed through so that magnetic field of this current is equal to and opposite the ship magnetic field which is a permanent magnet. When these fields are combined, they neutralize each other and the ship passes the mine without operating them (http://www.centralclubs.com/topic-t59589.html).

Additionally, given that a part of shipping path in Persian Gulf is located within Iranian territorial waters, if Iran fulfill its threat these waters will be mined. Any attempt of US minesweepers including helicopters, ships or submarines will results in entrance of minesweepers into Iranian territorial waters which is not only contrary to international regulations but also is followed by targeting these equipments which will results in struggle.

8. Conclusion

Contrary to military capabilities of United State and the Allies, Iran is able keep blocking Hormuz Strait in a long term. Facilities of Iran to do this is cruise and ballistic anti-ship missiles, small fast boats, drones, small submarines, naval mines and standoff missiles and supported by air defense and electronic warfare (Jangal).

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