biofuels, solar energy, and wind energy.

[14] It is an aspect of the present invention to provide a fuel supply system for eco-friendly ships, which can meet regulations on shipping's greenhouse gas emissions to tightened in the coming years using ammonia which is a chemical substance that has been used in onshore applications for more than 100 years and has a fully tested supply chain, including production/storage/transportation/supply, among the aforementioned non-fossil fuels.

【Technical Solution】

Summary

[14a] In an aspect, the present disclosure refers to a fuel supply system for eco-friendly ships, comprising:

an engine;

a fuel storage tank storing a first fuel to be supplied as fuel to the engine;

an ammonia storage tank storing ammonia to be supplied as fuel to the engine; and

a greenhouse gas analyzer disposed on an exhaust line through which exhaust gas discharged from the engine passes and detecting greenhouse gases contained in the exhaust gas,

wherein the fuel supply system is operated in one of: a first fuel supply mode in which only the first fuel is supplied to the engine; an ammonia supply mode in which only the ammonia is supplied to the engine; and a fuel mixture supply mode in which the fuel mixture of the first fuel and the ammonia is supplied to the engine,

wherein an operation mode of the fuel supply system is controlled based on values detected by the greenhouse gas analyzer,

wherein, when the fuel supply system is operated in the fuel mixture supply mode, a mixing ratio of the first fuel to the ammonia is regulated based on values detected by the greenhouse gas analyzer.

[14b] In an aspect, the present disclosure refers to a fuel supply system for eco-friendly ships, comprising:

an engine;

a fuel storage tank storing a first fuel to be supplied as fuel to the engine;

an ammonia storage tank storing ammonia to be supplied as fuel to the engine:

an SCR device disposed on an exhaust line through which exhaust gas discharged from the engine passes and reducing nitrogen oxides in the exhaust gas;

a greenhouse gas analyzer disposed on the exhaust line downstream of the engine and detecting greenhouse gases contained in the exhaust gas;

an NOx analyzer disposed on the exhaust line downstream of the engine and detecting nitrogen oxides contained in the exhaust gas discharged from the engine;

a first supply line along which the first fuel is supplied from the fuel storage tank to the engine;

a second supply line along which the ammonia is supplied from the ammonia storage tank to the engine; and

a third supply line along which the ammonia is supplied from the ammonia storage tank to the SCR device,

wherein the engine is operated with one selected from among the first fuel and the ammonia or with a fuel mixture of the first fuel and the ammonia,

wherein the ammonia stored in the ammonia storage tank is supplied selectively or simultaneously to the engine and the SCR device,

wherein the ammonia serves as a fuel for the engine when supplied along the second supply line and serves as a reducing agent for the SCR device when supplied along the third supply line,

wherein supply of the first fuel along the first supply line and supply of the ammonia along the second supply line are controlled based on values detected by the

greenhouse gas analyzer, and

supply of the ammonia along the third supply line is controlled based on values detected by the NOx analyzer.

[15] In accordance with one example of the present disclosure, there is provided a fuel supply system for eco-friendly ships, including: an engine; a fuel storage tank storing a first fuel to be supplied as fuel to the engine; and an ammonia storage tank storing ammonia to be supplied as fuel to the engine, wherein the engine is operated with one selected from among the first fuel and the ammonia or with a fuel mixture of the first fuel and the ammonia.

[16] The fuel supply system may be operated in one of: a first fuel supply mode in which only the first fuel is supplied to the engine; an ammonia supply mode in which only the ammonia is supplied to the engine; and a fuel mixture supply mode in which the fuel mixture of the first fuel and the ammonia is supplied to the engine.

[17] The fuel supply system may further include: a greenhouse gas analyzer disposed on an exhaust line through which exhaust gas discharged from the engine passes and detecting greenhouse gases contained in the exhaust gas, wherein the operation mode of the fuel supply system may be controlled based on values detected by the greenhouse gas analyzer.

[18] When the fuel supply system is operated in the fuel mixture supply mode, a mixing ratio of the first fuel to the ammonia may be regulated based on values detected by the greenhouse gas analyzer.

[19] The fuel supply system may further include: a first control valve disposed on a fuel supply line along which the first fuel is supplied from the fuel storage tank to the engine; and a second control valve disposed on an ammonia supply line along which the ammonia is supplied from the ammonia storage tank to the engine, wherein

the first control valve and the second control valve may be controlled based on values detected by the greenhouse gas analyzer.

[20] The fuel supply system may further include: a heater disposed on the ammonia supply line and heating the ammonia to a temperature suitable for use in the engine.

[21] The engine may be an oil engine using a fuel in a liquid state at room temperature, and the first fuel may be one selected from among HFO, LSFO, ULSFO, MGO, and MeOH.

[22] Alternatively, the engine may be a gas engine using a fuel in a gaseous state at room temperature, and the first fuel may be one selected from among of LNG, LPG, LEG, and DME and may be stored in a liquefied state in the fuel storage tank.

[23] When the engine is a gas engine, the fuel supply system may further include: a vaporizer disposed on the fuel supply line and forcibly vaporizing the first fuel in the liquefied state; and a heater heating the first fuel vaporized by the vaporizer to a temperature suitable for use in the engine.

[24] In accordance with another example of the present disclosure, there is provided a fuel supply system for eco-friendly ships, including: an engine; a fuel storage tank storing a first fuel to be supplied as fuel to the engine; an ammonia storage tank storing ammonia to be supplied as fuel to the engine; and an SCR device disposed on an exhaust line through which exhaust gas discharged from the engine passes and reducing nitrogen oxides in the exhaust gas, wherein the engine is operated with one selected from among the first fuel and the ammonia or with a fuel mixture of the first fuel and the ammonia, and the ammonia stored in the ammonia storage tank is supplied selectively or simultaneously to the engine and the SCR device.

[25] The fuel supply system may further include: a first supply line along which the first fuel is supplied from the fuel storage tank to the engine; a second supply line along which the ammonia is supplied from the ammonia storage tank to the engine; and a third supply line along which the ammonia is supplied from the ammonia storage tank to the SCR device, wherein the ammonia serves as a fuel for the engine when supplied along the second supply line and serves as a reducing agent for the SCR device when supplied along the third supply line.

【CLAIMS】

【Claim 1】

A fuel supply system for eco-friendly ships, comprising:

an engine;

a fuel storage tank storing a first fuel to be supplied as fuel to the engine;

an ammonia storage tank storing ammonia to be supplied as fuel to the engine; and

a greenhouse gas analyzer disposed on an exhaust line through which exhaust gas discharged from the engine passes and detecting greenhouse gases contained in the exhaust gas,

wherein the fuel supply system is operated in one of: a first fuel supply mode in which only the first fuel is supplied to the engine; an ammonia supply mode in which only the ammonia is supplied to the engine; and a fuel mixture supply mode in which the fuel mixture of the first fuel and the ammonia is supplied to the engine,

wherein an operation mode of the fuel supply system is controlled based on values detected by the greenhouse gas analyzer,

wherein, when the fuel supply system is operated in the fuel mixture supply mode, a mixing ratio of the first fuel to the ammonia is regulated based on values detected by the greenhouse gas analyzer.

【Claim 2】

The fuel supply system according to claim 1, further comprising:

a first control valve disposed on a fuel supply line along which the first fuel is supplied from the fuel storage tank to the engine; and

a second control valve disposed on an ammonia supply line along which the ammonia is supplied from the ammonia storage tank to the engine,

wherein the first control valve and the second control valve are controlled based on values detected by the greenhouse gas analyzer.

【Claim 3】

The fuel supply system according to claim 2, further comprising:

a heater disposed on the ammonia supply line and heating the ammonia to a temperature suitable for use in the engine.

【Claim 4】

The fuel supply system according to claim 1, wherein the engine is an oil engine using a fuel in a liquid state at room temperature, and the first fuel is one selected from among HFO, LSFO, ULSFO, MGO, and MeOH.

【Claim 5】

The fuel supply system according to claim 1, wherein the engine is a gas engine using a fuel in a gaseous state at room temperature, and the first fuel is one selected from among of LNG, LPG, LEG, and DME, the first fuel being stored in a liquefied state in the fuel storage tank.

【Claim 6】

The fuel supply system according to claim 5, further comprising:

a vaporizer disposed on the fuel supply line and forcibly vaporizing the first fuel in the liquefied state; and

a heater heating the first fuel vaporized by the vaporizer to a temperature suitable for use in the engine.

【Claim 7】

A fuel supply system for eco-friendly ships, comprising:

an engine;

a fuel storage tank storing a first fuel to be supplied as fuel to the engine;

an ammonia storage tank storing ammonia to be supplied as fuel to the engine:

an SCR device disposed on an exhaust line through which exhaust gas discharged from the engine passes and reducing nitrogen oxides in the exhaust gas;

a greenhouse gas analyzer disposed on the exhaust line downstream of the engine and detecting greenhouse gases contained in the exhaust gas;

an NOx analyzer disposed on the exhaust line downstream of the engine and detecting nitrogen oxides contained in the exhaust gas discharged from the engine;

a first supply line along which the first fuel is supplied from the fuel storage tank to the engine;

a second supply line along which the ammonia is supplied from the ammonia storage tank to the engine; and

a third supply line along which the ammonia is supplied from the ammonia storage tank to the SCR device,

wherein the engine is operated with one selected from among the first fuel and the ammonia or with a fuel mixture of the first fuel and the ammonia,

wherein the ammonia stored in the ammonia storage tank is supplied selectively or simultaneously to the engine and the SCR device,

wherein the ammonia serves as a fuel for the engine when supplied along the second supply line and serves as a reducing agent for the SCR device when supplied along the third supply line,

wherein supply of the first fuel along the first supply line and supply of the ammonia along the second supply line are controlled based on values detected by the greenhouse gas analyzer, and

supply of the ammonia along the third supply line is controlled based on values detected by the NOx analyzer.

【Claim 8】

The fuel supply system according to claim 7, further comprising:

heaters disposed on the second supply line and the third supply line and heating the ammonia to a temperature suitable for use in the engine and the SCR device, respectively.

【Claim 9】

The fuel supply system according to claim 7, further comprising:

a return line branched off of the exhaust line downstream of the SCR device and returned to the SCR device,

wherein the NO_x analyzer comprises: a first NO_x analyzer disposed between the engine and the SCR device; and a second NO_x analyzer disposed downstream of the SCR device, and,

when analysis of values detected by the second NO_x analyzer indicates that a concentration of nitrogen oxides in the exhaust gas is greater than a permissible level, the exhaust gas discharged from the SCR device is returned to the SCR device along the return line.

【Claim 10】

The fuel supply system according to claim 7, wherein the first fuel is one selected from among HFO, LSFO, ULSFO, MGO, MeOH, LNG, LPG, LEG, and DME.