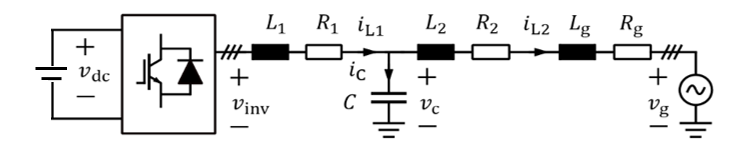
## **Impedance Model for Inverter with ACC-PLL-VDC**

## **System Configuration**



In the following, the superscript ‘’s’’ stands variables in system frame, while ‘’c’’ represents variables in control frame synchronized by PLL.

## **Current Control**

**Controller output**

(1)

**Voltage feed forward (VFF) filter**

(2)

**Modulator delay**

Pade1 formula is considered.

(3)

Where

**PI Controller**

(4)

**Decoupling**

(5)

**Active damping**

(6)

## **LCL Filter**

(7)

(8)

## **Passivity Control**

## **Phase-Locked Loop (PLL)**

**PI Controller of PLL**

(9)

**Small-signal model of PLL**

(10)

**PLL effect**

(11)

(12)

(13)

(14)

(15)

## **Substitution**

**Current controller**

Linearizing (1)

(16)

Substituting (8) (12)-(15) to (16)

(17)

Rearranging (17)

(18)

**LCL filter**

Linearizing (7)

(19)

Substituting (18) to (19)

(20)

## **Impedance model**

Rearranging (20)

(21)

(22)