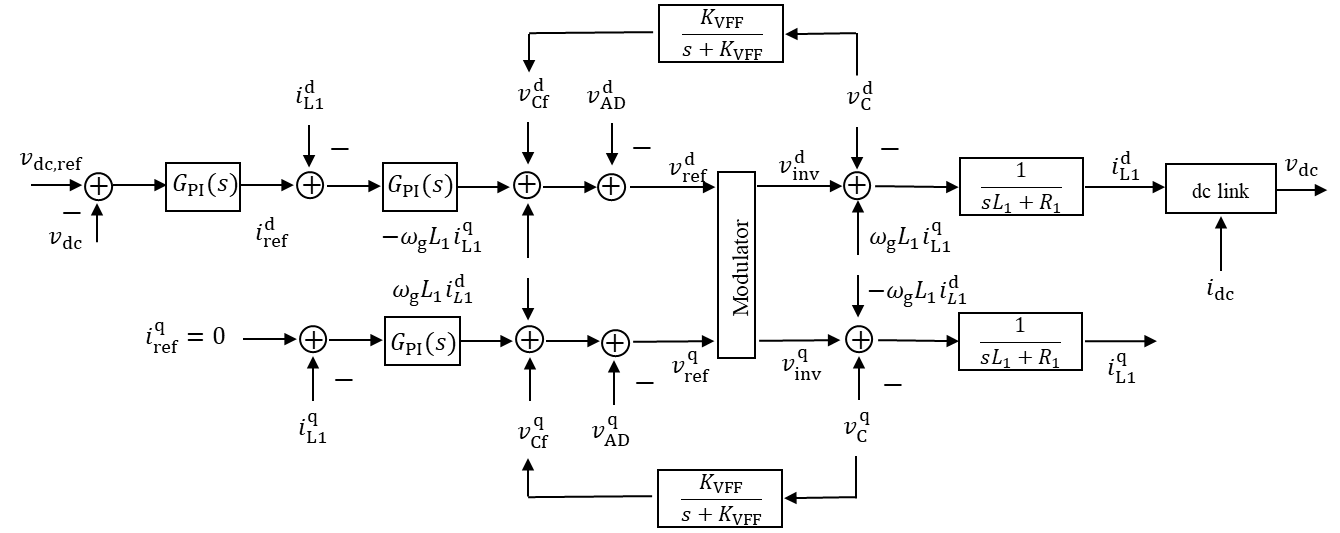
**The structure of PV inverter**



## **DC Voltage Control**

**Controller state**

**Controller output**

**State Space Model**

Where , , ,

, , , .

## **Current Control**

**Controller state**

**Controller output**

**Active damping**

**State Space Model**

Where ,,

,

, ,

,

.

## **Modulator**

**State**

**Output**

**State Space Model**

Where ,,,,

,, .

## **LCL Filter**

**State Space Model**

Where ,,,

, ,

,.

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

**State Space Model**

Where ,,,,,

, .

## **Detailed Phase-Locked Loop (DPLL)**

**State Space Model**

Where ,,,, , , .

## **DC-Link Capacitor**

**State Space Model**

Where ,,,, , ,.

## **Power Angle relationship**

## **Control frame 🡪 System frame**

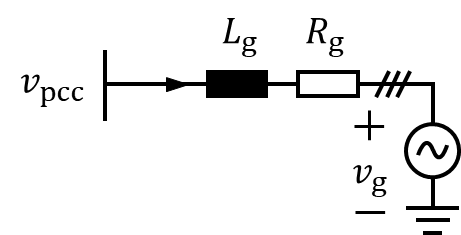
## **System frame 🡪 Control frame**

## **System frame 🡪 DQ frame**

## **DQ frame 🡪 system frame**

**Complete Inverter Model**

## **Grid**



**State**

**Output**

**State Space Model**

Where ,, ,

,,, .

**Complete System Model**

Where

,

CCM: