CONTROL OF PARTICLE CIRCULATION RATE IN CIRCULATING FLUIDIZED BED BY A PULSED GAS FLOW

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As a coal-fired power generation technology for further improvement of power generation efficiency of coal-fired power generation, exergy regeneration type coal gasification power generation technology (1), a triple-bed circulating fluidized bed (2), has been proposed.

The authors analyzed the flow characteristics of the triple-bed circulating fluidized bed, it has the flow characteristics of the riser and downer perform the proposed approach to representation by the equivalent circuit model. The equivalent circuit model of the riser and downer are shown in Figure 1. This equivalent circuit has the nature of the low-pass filter. A combination of the low-pass filter and the pulse voltage is used as a switching power supply. Then, we applied that the pulsed gas supply to the riser combined with a low-pass filter characteristics to control the particle circulation rate of the triple-bed circulating fluidized bed.

Figure 2 shows the input output characteristics of the equivalent circuit of the riser/downer inputting a pulse voltage. We used an electric circuit simulator SPICE to calculation of circuit behavior. Circuit constant is to use the value of the reference 3, the input pulse height is set to 80V. When the input pulse width is changed, the output current is changed depending on the pulse width. Moreover, when changing the density of the pulse, the output current is changing depending on the pulse density. This result by giving a pulsed gas supply to the riser, it shows the possibility controlling the particle circulation rate of the triple-bed circulating fluidized bed.

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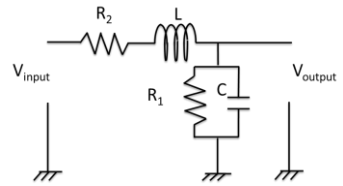

Figure 1. Equivalent circuit model of the downer/riser flow.

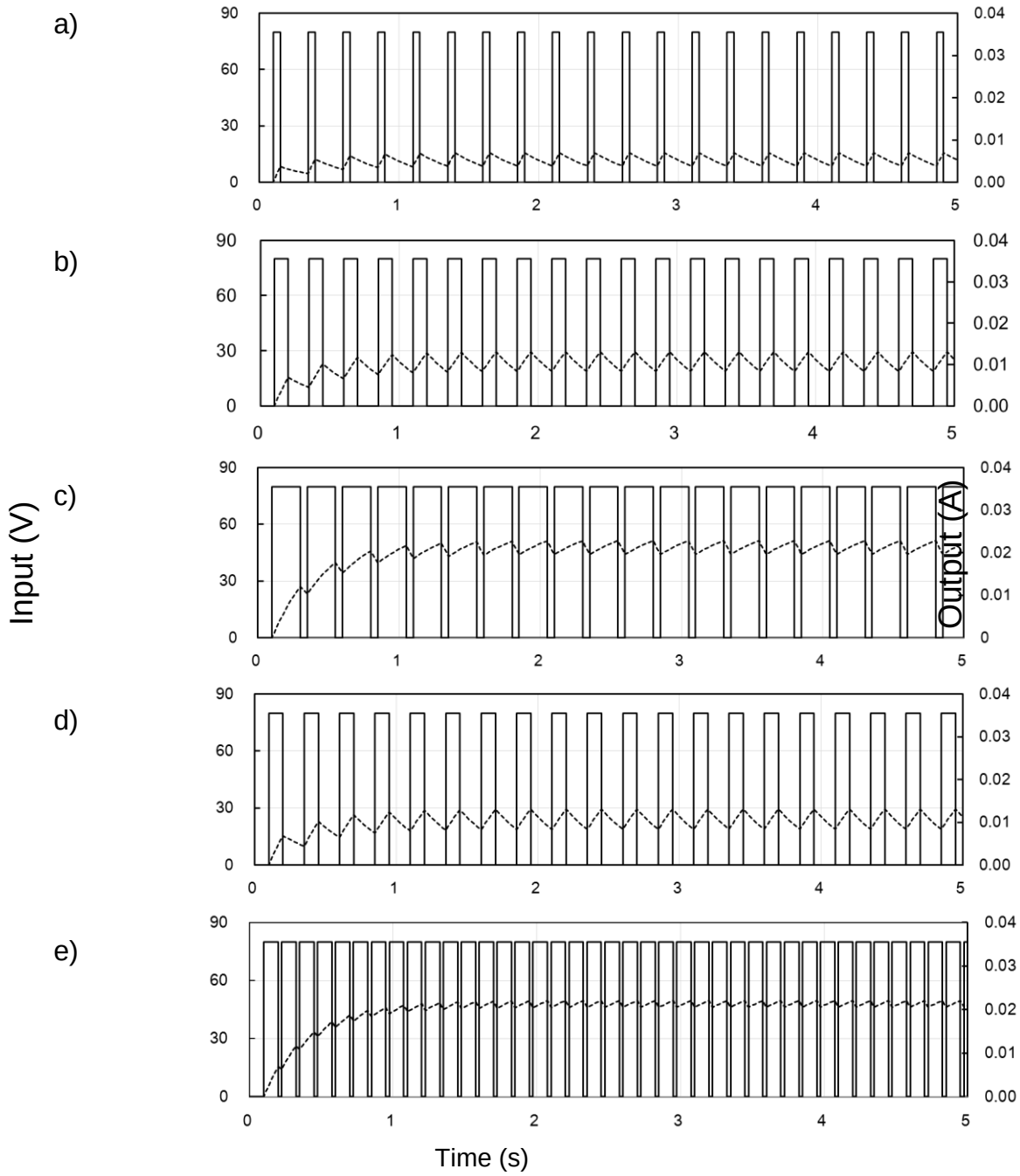

Figure 2. Input-output characteristic of equivalent circuit model. Solid line: input pulse. Dot line: output current. Pulse width modulation a) 0.05 s, b) 0.1 s, c) 0.2 s. Pulse density modulation d)&e)