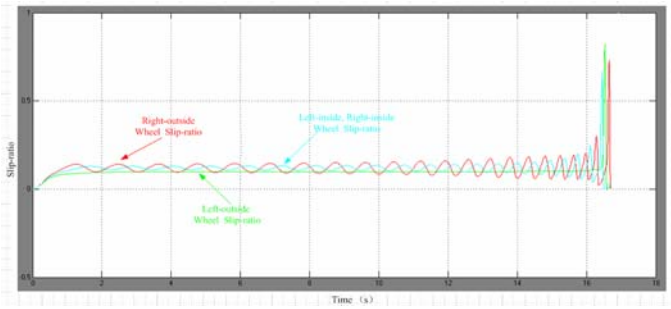
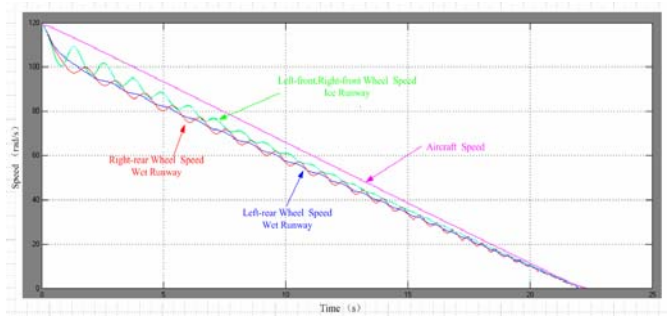
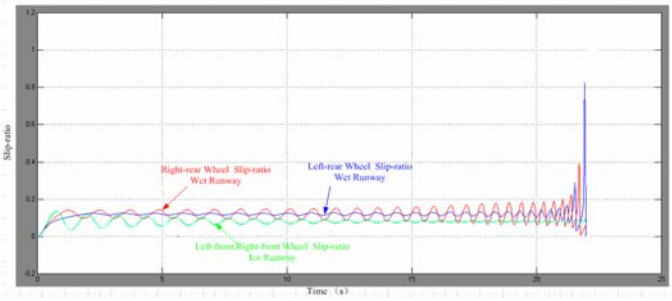


b. Slip-ratio vs. time

Figure 11. Simulation results of different load in left and right



a. Speed vs. time



b. Slip-ratio vs. time

Figure 12. Simulation results of different load and runway status

Figure 8-12 shows the simulation results of several common landing states of the multi-wheel aircraft:

1).In case of the same runway and load, the slip-ratio and speed of each braked wheel are highly consistent; 2). Due to the drainage of the front wheel, the front wheel slip-ratio is lower than the rear wheel; 3). The speed and slip-ratio of inside wheel with higher load are more smooth and stable than the outside wheel; 4). Under the different load with non-symmetry, the performances of inside wheel of left and right side are same, the speed and slip-ratio of left outside wheel is most smooth, and the load of right outside wheel with the worst performance is lightest; 5). Under the runway and load are all different, the left and right front wheel is not sensitive to the load difference on the ice runway. The load and runway friction coefficient of left rear wheel are higher than the other wheels, and the wheel speed and slip ratio is relatively stable, followed by the right rear wheel; 6). Comparing to the runway status, the landing loads has little effect on braking time.

The individual wheel fuzzy control based on slip- ratio of muti-wheel braking system can accurately identify the runway status, real-time adjust the control parameters to maintain slip-rate in the vicinity of the ideal value. Thus the friction force of runway is furthest utilized, and the braking efficiency is improved, at the same time, the stability and security of aircraft ABS are improved.

V. CONCLUSION

The individual wheel fuzzy control mode based on slip-ratio is adapted to the aircraft muti-wheel braking system. According the different load and runway surface conditions, the control parameters are automatically adjust to take the greatest efficient use of the runway friction. The results also show that the runway status has greater impact on the overall braking performance of aircraft than the load. This paper lays the foundation for determining the multi-wheel aircraft braking characteristics in integrated environment. The crosswind, the nose wheel steering and rudder control, and other related systems will be the next work.

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