P5

**Our model can be divided into three parts: Math Model, Optimization in a mathematical account and Program.** The program part can verify the other two parts, and the optimization part can verify the models. The Math model part mainly discusses the factors that decide a plan is good or not: total boarding time and passenger satisfaction, and also includes some optimization. The optimization part is about ways to make the strategy better. And the program part is to simulate the boarding process, to verify our conclusion given by the model part.

P6

The inherent structure of the problem indicates that **our model will be discrete.** Therefore, apart from the intuitive ones, other assumptions, such as the third one in this slide, will hinge on this property of discreteness. On the other hand, **it’s also important to make our assumptions plausible.** This is the main reason for making most of the **seemingly impulsive hypothesis** afterwards.

P7

**These two assumptions are about the moving state of passengers and we’ve given correspondent justifications.**

P8

**These assumptions are respectively proposed to simulate reality and to simplify our calculations.**

P9

**Here are the assumptions of Model A.** In Model A, we would **consider the single-aisle case (although in our presentation we tend to combine it with other types of aircraft due to their similar deduction methods)**. It’s important to note that since we’ll vary the stowing time of passengers in the later slides, the first assumption is rather reasonable. **The time wasted while passengers try to stuff extra luggage into their seats is qualitatively equivalent to that spent while stowing those extra luggage.**

**For the second assumption on this slide, we disambiguated the expression in or essay by using this interpretation: passengers always maintain maximum theoretical speed. A corollary to this is that queuing has the same effect on a *block* of adjacent passengers.**

P10

**Here are the last two assumptions. We’ll explain the second assumption soon afterwards.**

P11

**As for the velocity, we assume that the velocity in a certain cell remains constant.** This means that V\_i (A) could be thought as points on the velocity function. Though it might not be so realistic, **this assumption enables us to simplify the calculation for the velocity (for it was only used when calculating distance) and wouldn't cause a lot of inaccuracy** (meaning that it wouldn't cause much change to the total time), as shown in the graph. This is partly because **the basic timestep is only 1/6 sec, a very short time** that wouldn't influence the velocity and distribution of passengers much, and thus according to the formula of calculating velocity, **the velocity in a certain timestep wouldn't change much**, so it can be seen as a constant.

P12

**In the model, the definition of time and velocity is different from SI, and this is the relationship between SI time and velocity and ours. We make these changes to make the calculations simpler.**

P37

**Disembarking is almost just the reverse of boarding,** for the motion is just the reverse from boarding. **So the best strategy should be similar to boarding.** However, for there’s no offering cells, the passengers have already been in an ideal queue, thus spending less time than boarding because of higher parallelity.

P38

Besides the total time, passengers’ **satisfaction** is also an important factor to take into account. In real-life experiences, dissatisfaction mainly comes from queuing and offering seats. And according to the strict sequence, some fellow passengers may be split, causing some dissatisfaction (though mistakenly not written in the essay). **The total dissatisfaction index is the weighted sum of the three factors.**

P39

**The weights of the factors are respectively 1, 250 and 10. The reason for 1 is for standardization, and 250 and 10 are according to real-life experience, and also to unite magnitudes to make the ultimate dissatisfaction index combine the three factors.**

P52

For the Flying Wing aircraft, as we've already divided it into four blocks, we define the intersection point of the main aisle and the ith block aisle as (i, 0, 0), and the ith block aisle as its x-grid. And for the TETA aircraft, we define the entrance cell in the left as (0, 0), and the direction of the two aisles as the x-grid. **The seats with a negative x-coordinate are the first class. And for the rest, passengers with seats x-coordinated 1 and 9 would board first, while those with 4 and 6 board last.**

P53

**Here is the coordinates for the TETA Aircraft.**

P55

**Here are the main ideas when we apply the model to different aircrafts.** TETA and the Flying Wing are two kinds of multi-aisle aircrafts, and we found that **they can be divided into smaller individual parts similar to ordinary one-aisle aircrafts.**

P56

To optimize the whole plan, it’s obvious that we need to **optimize the boarding sequence inside groups,** and then we need to **optimize the between-group sequences.**

P57

To ensure that every cell is used, we decide to **arrange a few inner group passengers to fill up empty blocks.**