So now I am going to talk about the current result of Newton-Raphson calculation. For this part, we take both the impedance and the half line charging admittance into consideration to calculate current flowed from one bus to another. And for the current results, we can see the current values of line1-5, line2-6, line4-10 and line3-11 are quite close, which is in line of our expectations since bus 1, 2, 3 and 4 are connected to the generator and bus 5, 6, 10 and 11 are the nodes directly connected to those buses. And for bus 7 and bus 9, since there is one capacitor in parallel with each bus respectively, we also calculate the current in these two grounded buses.

And for the power flow calculation, we utilize the current result and admittance matrix we got in the previous step. For most lines, we can see that the value of Sij and Sji are quite close and the line loses are relatively low, which means our proposed system has high utilization rate. And for the three PV buses and the slack bus, the real number of line loses are zero, which fulfills the requirement.

As for the contingency analysis, we choose to delete bus 5, and the new grid looks like this one. The line56 is erased and the transformer T1 is connected to bus 6 directly. So now there are 10 buses including the slack bus, 3 PV buses and 6 PQ buses. All the other information of the grid remains the same.

For this new grid, the result of node voltages is listed below. We can see both the absolute value and phase value have changed slightly compared to the original one, which makes sense since bus 5 is just a PQ bus with no loads connected to it.

For the current in each line, the most significant changes happened in line7-8 and line9-10, which makes sense cause these two lines are very close to the original bus 5, so they are relatively seriously affected.

The same thing happens in power flow of each line. The biggest changes are in line7-8 and line9-10. And the real numbers of line loses for PV buses and slack bus are still zero.

Compared to the original grid, there are some changes in the new grid. For each PQ bus (6-11), the absolute value of voltage slightly increases while the phase value changes a lot. For the slack bus and all the PV buses (1-4), the phase value of voltage and input power changes a little bit. For the power flow changes in each line, if the line is closer to the deleted bus, the changes in the power flow, line losses and line current will be greater. In summary, the failure of bus 5 does not cause significant changes in the new system.