

## **46ESS-31: Variable Geometry Gas Turbines**

**XIAOYU GU**

*Gas turbines nowadays are working in many fields. The various operating conditions require gas turbines to work in a wide range and more efficiently, especially for navel engines and power engines. However, one of the problems associated with part loads is poor performance due to high losses and low efficiencies. Variable geometry components are capable of improving the off design performance of gas turbines, since they could reduce losses and change the cycle of the machines. In the variable geometry system, the movable vane segments are usually designed to change flow properties like incidence angle and swirl angle. As stationary gas turbines have fewer size-and-weight constrains, it is more reasonable to use variable engines rather than fixed geometry ones in these cases. The main components, compressor, turbine and nozzle have evolved implemented with variable structure to improve their off-design performance, calling VGV, VSV, VAN, respectively. Experiments and simulations results showed that variable geometry has a promising effect on fuel consumption and engine output. Additionally, the concept of variable combustor has also attracted some attention, which can operate with a better efficiency and fewer emissions in both high power and low power conditions. Based on experiments results, new component maps can be derived for performance simulation.*