46ESS-49: Pulse Detonation Engine

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The Pulse Detonation Engine (PDE) represents a promising concept for the future of aircraft propulsion since it ensures a lower Specific Fuel Consumption compared to both turbojets and turbofans. It is based on the propagation of a detonation leading to a large increase of pressure which is eventually used to create the thrust. The PDE can be used for a very wide range of flight velocities and leads to a substantial reduction of the engine size and complexity.

As described above, the PDE can be seen as a propulsive system on its own. But the concept of the PDE may also be used within turbofans or turbojets (Hybrid PDE). For example, a Pulse Detonation Combustors (PDC) can be fitted in the bypass duct of a turbofan or replace a conventional after-burner in order to provide a higher thrust and/or reduce Specific Fuel Consumption. Many researches are also in progress to replace conventional combustors with PDC.

However, it exists various issues with the PDE such as the noise, the mechanical problems arising from the high level of vibration produced by the detonation as well as the control and the creation of the detonation process. Many researches need to be undertaken to overcome those issues.