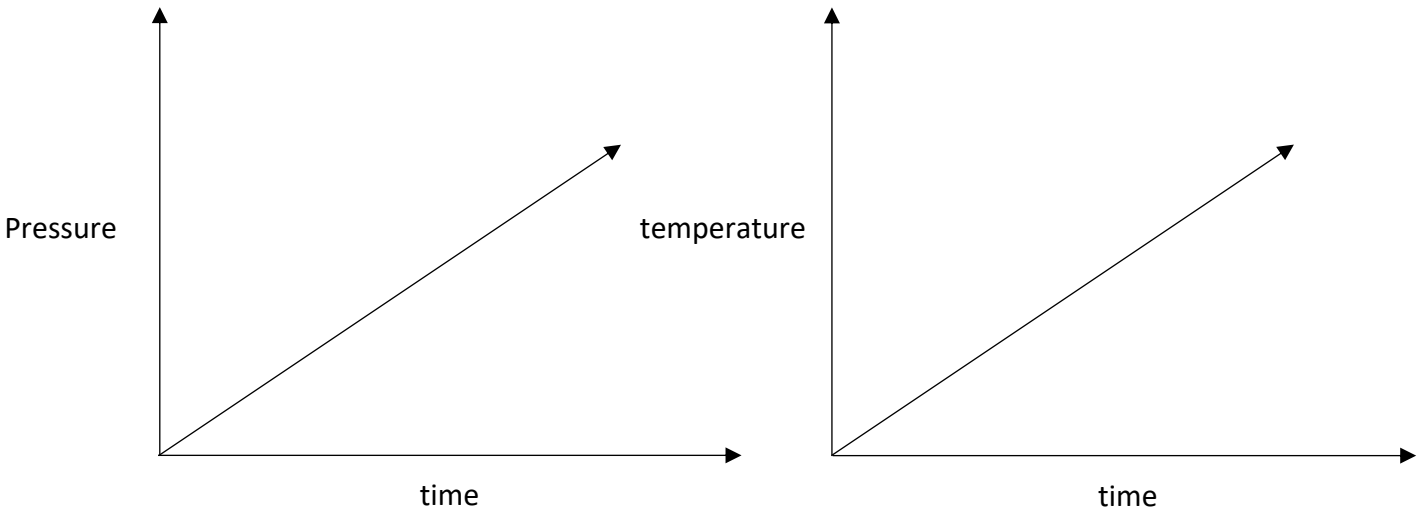
## Automatic Engine Termination System

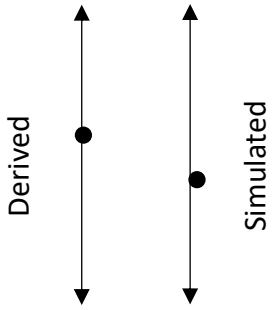
The Automatic Engine Termination System compares simulation data to actual engine performance. If operation is not in bounds engine terminated.

The metrics compared by the AETS system are pressure and temperature.

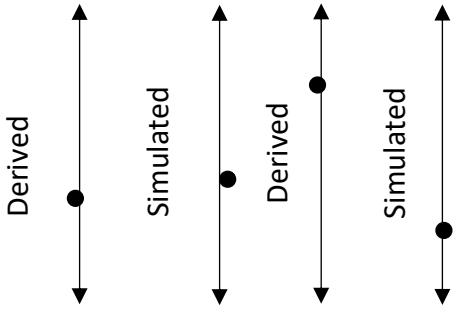



**Process:**

The AETS algorithm compares data at a (timestamp) to equivalent simulation data at its corresponding (timestamp). With an additional grace range (+ 5 / -5). Different data sources are separated into channels where they are independently compared to their associated simulation data. Each channel can contain comparisons with as many as 2 independent data sources.




**Channel 1 – Temp**
**(1 Comparison)**




**Channel 2 – Pressure**
**(2 Comparisons)**

(*v2 AETS implementing anomaly detection algorithms in analysis)

**Anomaly Detection using Z-score**

Using *Z-score* is one of the most straightforward methodology. Z-score basically stands for the number of standard deviation that sample value is below or above the mean of the distribution. It assumes that each features fits a normal distribution, and calculating the z-score of each features of a sample give an insight in order to detect anomalies. Samples which have much features whose values are located far from the means are likely to be an anomaly.

$$z = \frac{x - \mu}{\sigma}$$

$\mu$ = Mean

$\sigma$ = Standard Deviation