**[10 Points] Annotated Bibliography #05 Loomis**

**Two-Page Annotated Bibliography (#05)**

* 1. **Summarize**

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| **Reference Document Examined:** | Ben-Arosh, Rachel and Gany, Alon “Similarity and Scale Effects in Solid-Fuel Ramjet Combustors,” Journal of Propulsion and Power, Vol.8 No.3, May-June 1992 |
| **Reviewer:** | Veronica Loomis |
| **Source of Document:** | Canvas |
| **Date of Review:** | April 6, 2023 |
| **Electronic File Name:** | Introduction to the Analysis of Supersonic Ramjet Power Plants-1.pdf |

**Summary of Paper:**

Solid fuel ramjet combustors are based on simplifications. The biggest difference between a SFRJ and other airbreathing combustors is that the solid fuel is placed inside of the combustor and it burns with the air that is flowing past it. The solid fuel regression rate is a very important parameter and is usually symbolized with r = aGn. However, with more studies being done, it is evident that more factors should be considered since many have been found that affect the regression rate.

In SFRJ combustors, the efficiency is mostly controlled by an aft-mixing-chamber. Since the temperatures are so large, the reactions within the chamber are fast. The temperatures of the fuel are close to that of the adiabatic flame temperature, and do not behave as a function of the overall O/F ratio. The inner combustor diameter increases over time since fuel regresses during combustion. Ignition delay exists so that certain conditions are fulfilled, such as an accurate fuel to air ratio. Combustor port diameter is inversely proportional to fuel regression rate.

This paper creates a set of rules that can help test a solid fuel ramjet motor in a full scale. Other methods that were used for gas turbines and liquid fuel ramjets are also applicable to SFRJ combustors. The main processes were thoroughly developed and tested so the model is sufficiently verified.

**B. Assess**:

**Important Facts from Document:**

1. The Mach number is characterized by compressibility effects.
2. In SFRJ combustors, the efficiency is mostly controlled by an aft-mixing-chamber.
3. Combustor port diameter is inversely proportional to fuel regression rate.
4. Ignition delay exists so that certain conditions are fulfilled, such as an accurate fuel to air ratio.
5. The fuel temperature is close to the adiabatic flame temperature.

**Key Figure from Document:**

Diagram

Description automatically generated

**Figure 1: Schematic Diagram of an SFRJ combustor**

**Important Relationships among Parameters Described in the Paper:**

1. As the motor size increases, the specific impulse is expected to decrease.
2. Convective heat transfer requires a constant ratio of the heat transfer to wall and heat generation in chamber.

**C. Reflect**

This paper did a good job at thoroughly explaining what SFRJ is and how it operates when compared to other airbreathing combustors. This will be beneficial in the project as a kind of overview.