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Burning Rate of Composite Solid Propellant

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The another examined how to be influenced the burning rate of composite solid propellant, which consists of Ammonium Perchlorate as oxidizer and Polyurethan as binder, by the oxidizer particle size and the gas flow parallel to the propellant surface. In this experiment the two dimensional internal burning type chamber, designed to be able to see the burning behavior from both sides through acryl windows, was used. This chamber magnitude is of the laboratory scale, so that it is very small.

When there is gas flow parallel to the propellant surface, the burning rate change was experienced recently. This may be mainly by reason of abration and heat transfer change. It is believed that this behavior occurs in rather high velocity range of flow. Solid propellant burns by the diffusion between vapor of oxidizer and binder, and then in low pressure range the regression rate of oxidizer is smaller than that of binder, so in microscopic view point oxidizer particle protrudes on the propellant surface. Does the burning rate change occur or not in this case, and in addition in much lower flow velocity than usual? Also, does the influence of the gas flow occur or not?

It is concluded the burning rate to change in this low flow velocity and according to the oxidizer particle size. On the basis of this experiment, from the burning mechanism of solid propellant, the author assumes the intensity of the diffusion between vapors of oxidizer particle and binder changes with the particle size and flow velocity.

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