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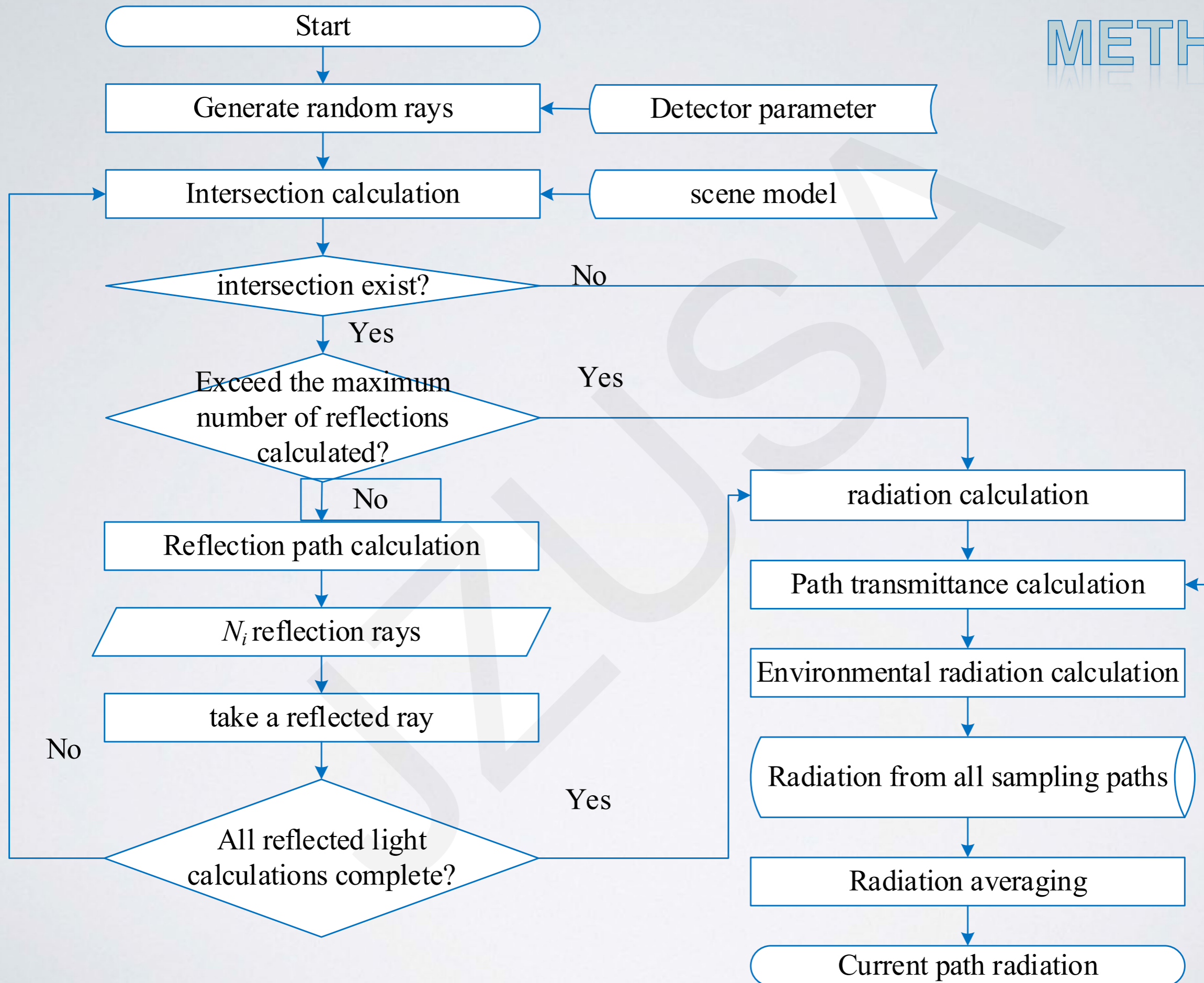
## **Calculation and experimental verification of radiation characteristics of spontaneous chaff clouds in high-speed flows**

### **Key words:**

Chaff clouds; Radiation calculation; Special radiance characteristics; Reactive metals; Spontaneous combustion

# Research objective

When the spontaneous chaff clouds diffuse in the air, there are a large number of shielding, absorption and reflection effects between chaffs, and there will be interactions between the chaffs and the air, which makes the calculation of radiation transmission relatively complicated. The aim of this paper is to calculate the radiation characteristics of spontaneous chaff clouds and generate radiation images.



# Results and conclusions

1. The temperature climbed quickly after the combustion of chaffs and reached the maximum at about 1.6s. Subsequently, the temperature dropped slowly and decreased to room temperature at about 6.0s.
2. The chaff cloud presented a long elliptical diffusion pattern. The diffusion area expanded gradually with time and the center of brightness shifted backwards.
3. The spectra of the chaff cloud developed maximal points at 1.4, 1.9, 3.1, 4.3, and 8.0 $\mu\text{m}$ . The peak was achieved at about 3.1 $\mu\text{m}$  and the maximum spectral radiation intensity was  $I_{\text{max}}=2418.5 \text{ W/sr}/\mu\text{m}$ .
4. The maximum total radiation intensity gained from the simulation of the 1–11 $\mu\text{m}$  waveband was  $I_{\text{calculation}}=6628.2 \text{ W/sr}$ .