

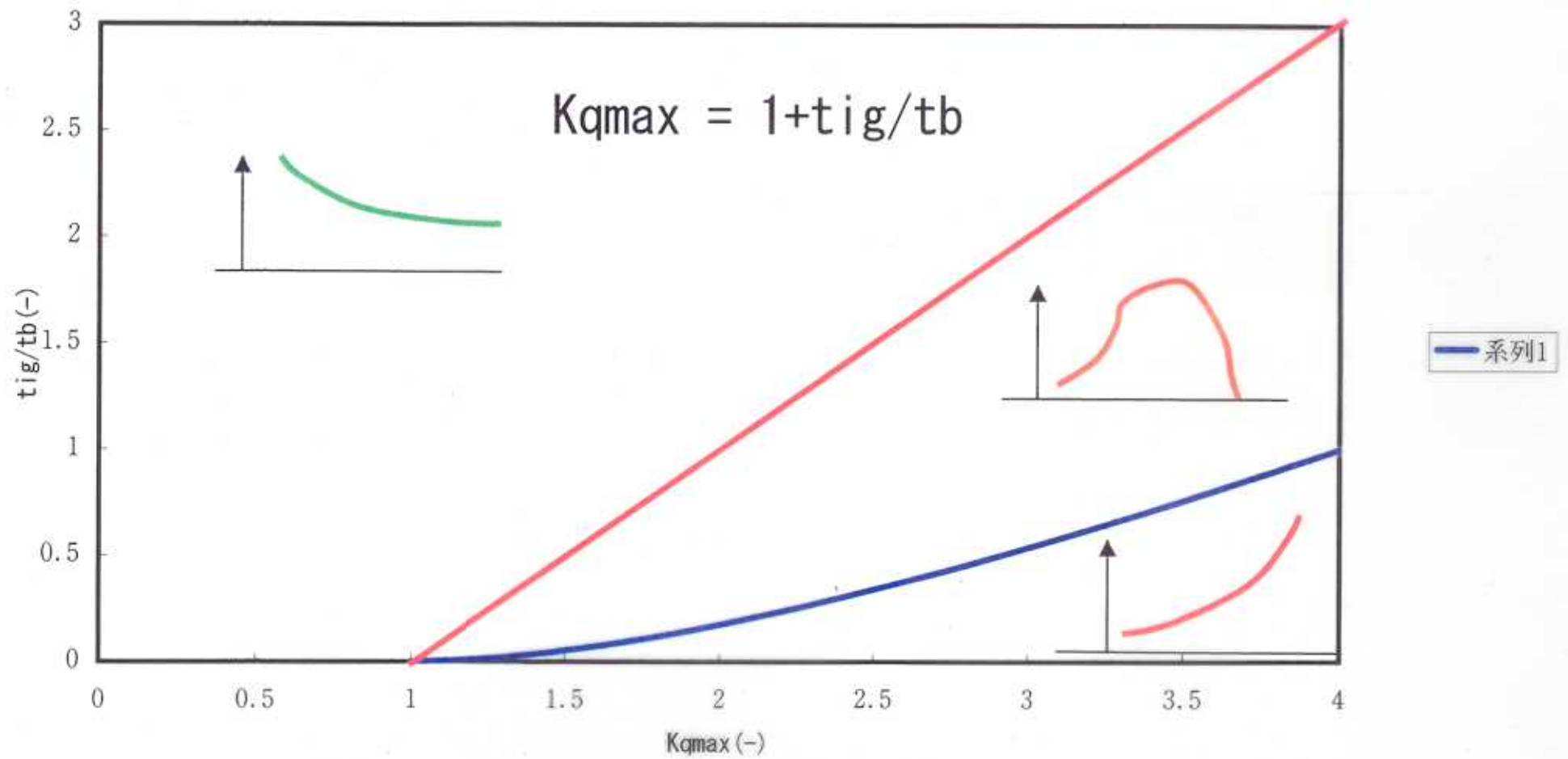
A REVISIT TO THE ASYMPTOTIC APPROACH TO FLASHOVER

Yuji Hasemi

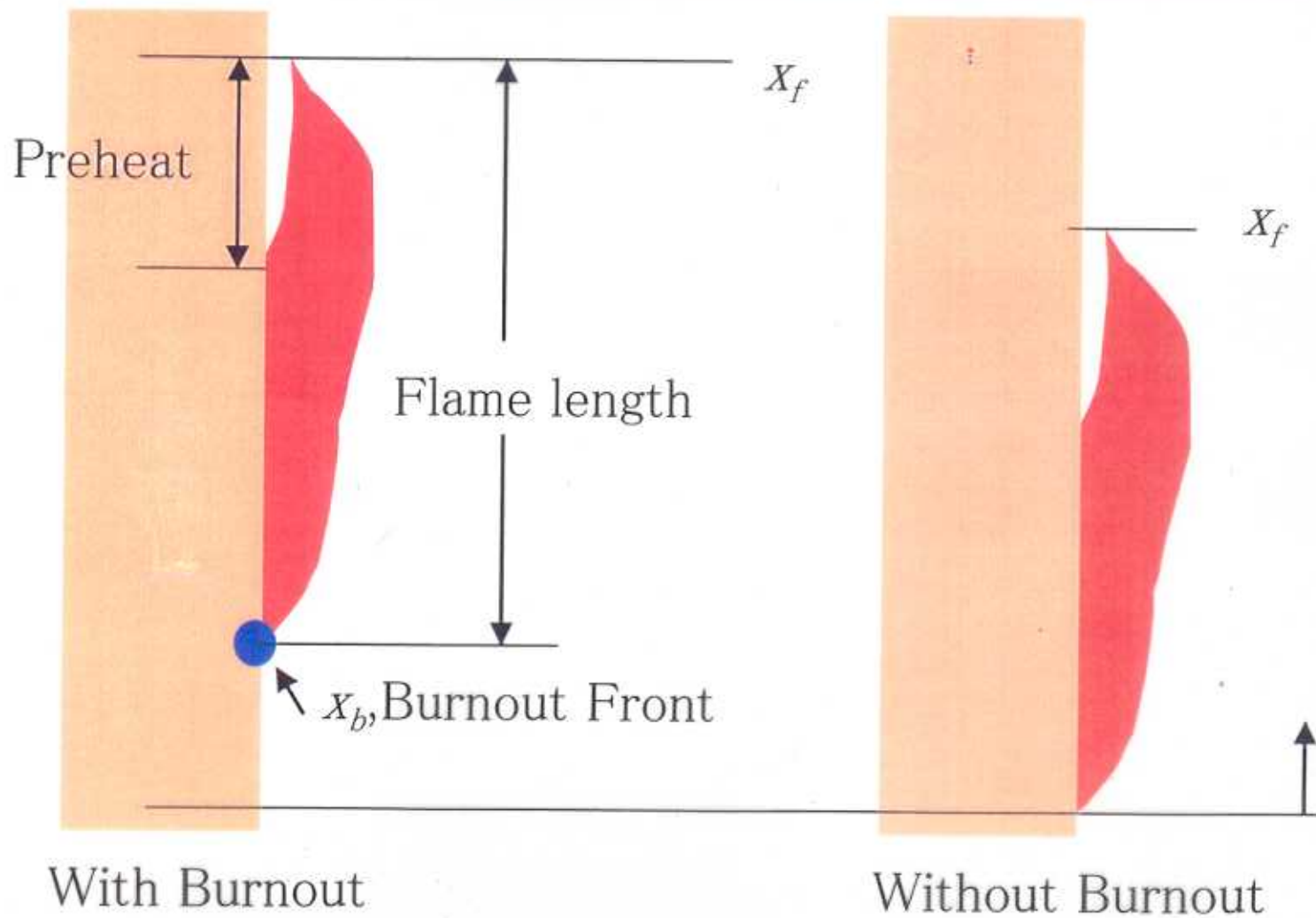
Waseda University, Japan

NIST Workshop on Fire Growth and Spread on Objects

BK Diagram



Disregard of burnout underestimates flame spread.



Acceleration/Deceleration Criteria

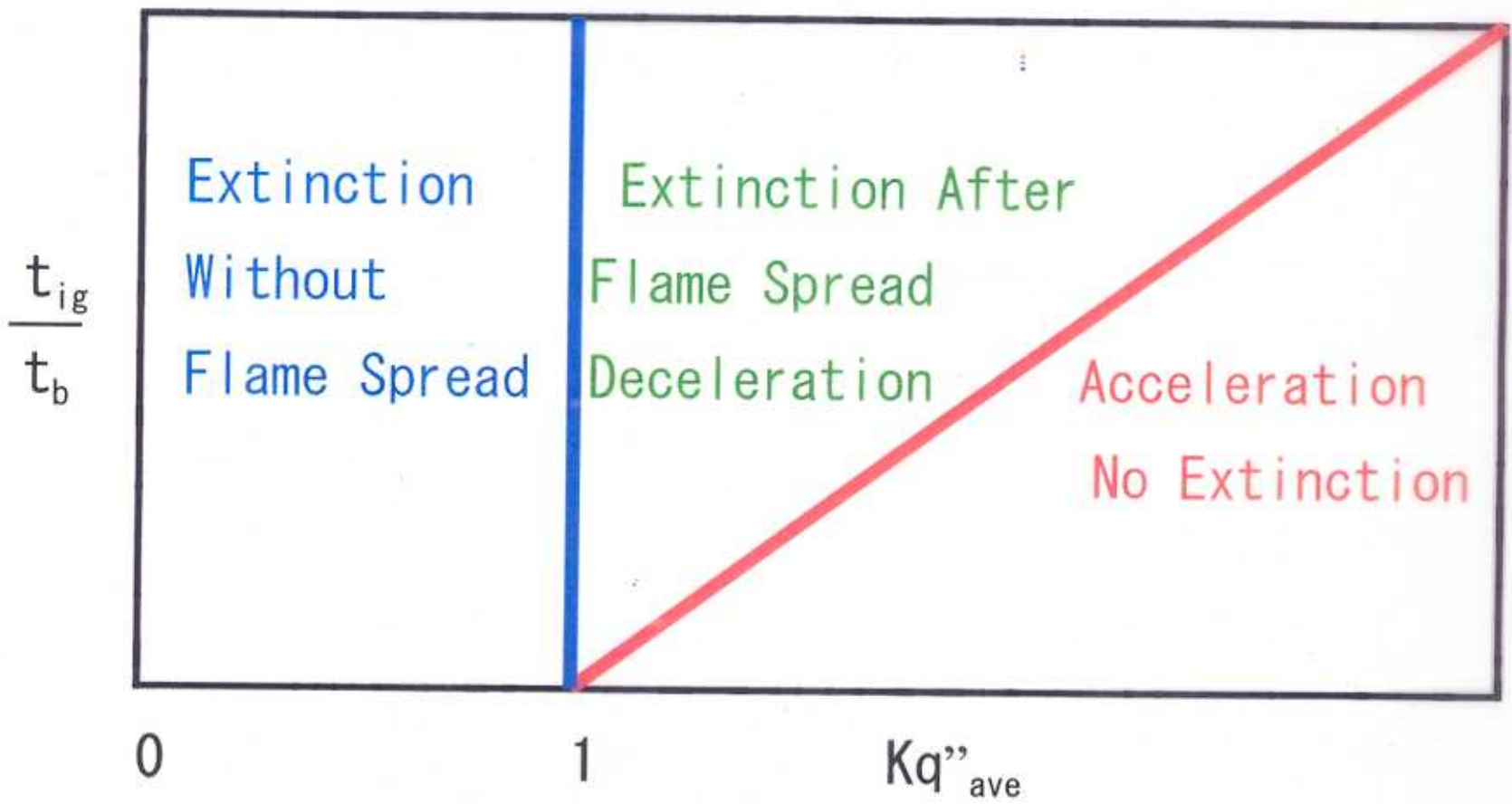
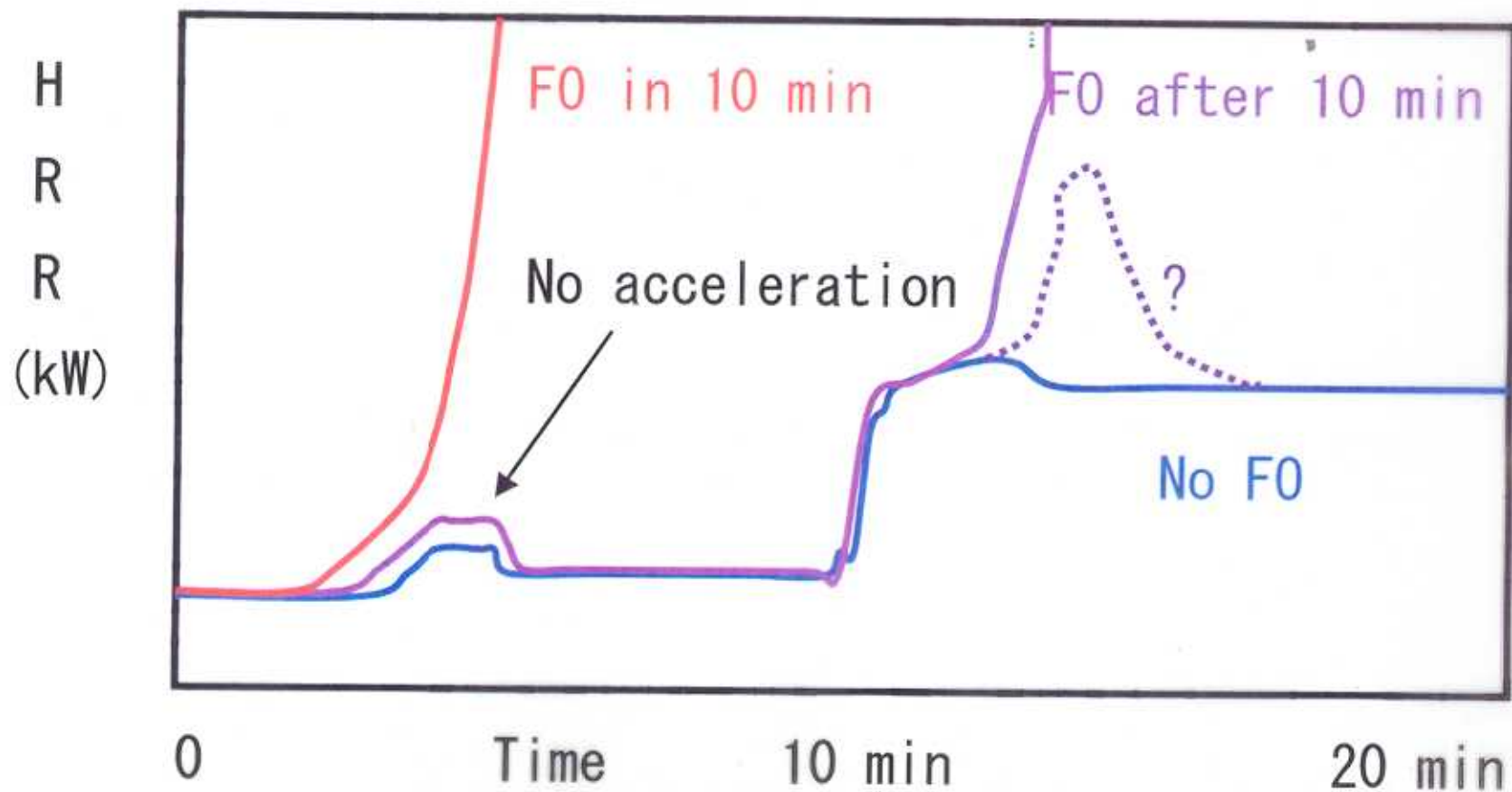


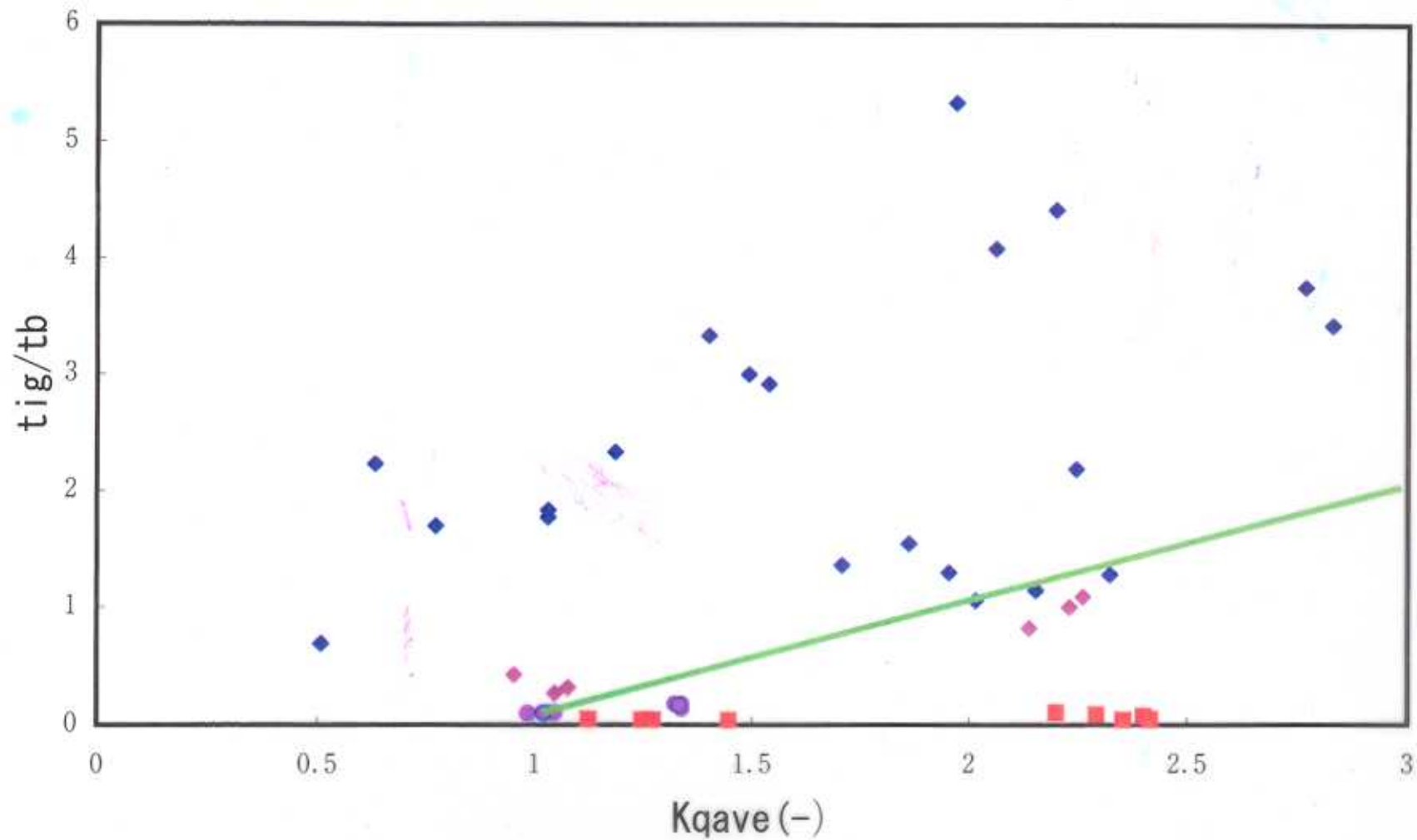
Table VII: Values of \dot{Q}''_{\max} and t_{ig} measured at an irradiance level of 50 kW/m² /14/, λ is an average of the values obtained by equation (52). The parameters $K\dot{Q}''_{\max}$ and $\lambda\tau$ are used in Figure 22.

Mat. no.	Material name	\dot{Q}''_{\max} [kW/m ²]	λ [s ⁻¹]	t_{ig} [s]	$K\dot{Q}''_{\max}$ [-]	$\lambda\tau$ [-]
S1	Insulating fib.board	184	0.0090	12	2.76	0.18
S2	Medium density fib.board	208	0.0027	28	3.12	0.13
S3	Particle board	204	0.0030	34	3.06	0.17
S4	Gypsum plasterboard	151	0.0390	34	2.26	2.25
S5	PVC cover on gyps. pl. b.	210	0.0600	10	3.15	1.02
S6	Paper cover on gyps. pl. b.	254	0.0600	21	3.81	2.14
S7	Textile cover on gyps. pl. b.	408	0.0700	20	6.12	2.38
S8	Textile cover on min. wool	466	0.0800	11	6.99	1.50
S9	Melamine-faced particle b.	150	0.0016	40	2.25	0.11
S10	Expanded polystyren	-	-	-	-	-
S11	Rigid polyurethane foam	247	0.0200	2	3.71	0.68
S12	Wood panel, spruce	168	0.0075	21	2.52	0.27
S13	Paper cover on particle b.	197	0.0041	27	2.96	0.18

Typical Flashovers in ISO9705 Room Corner Test

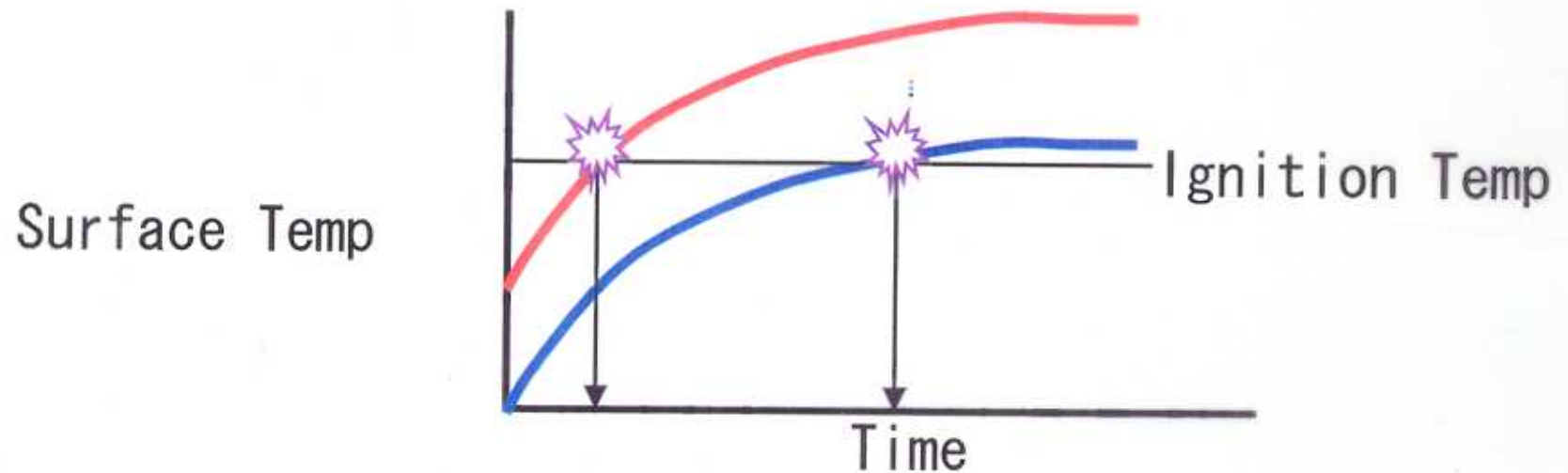


MATERIAL PROPERTIES AND FLASHOVER IN ROOM CORNER TEST



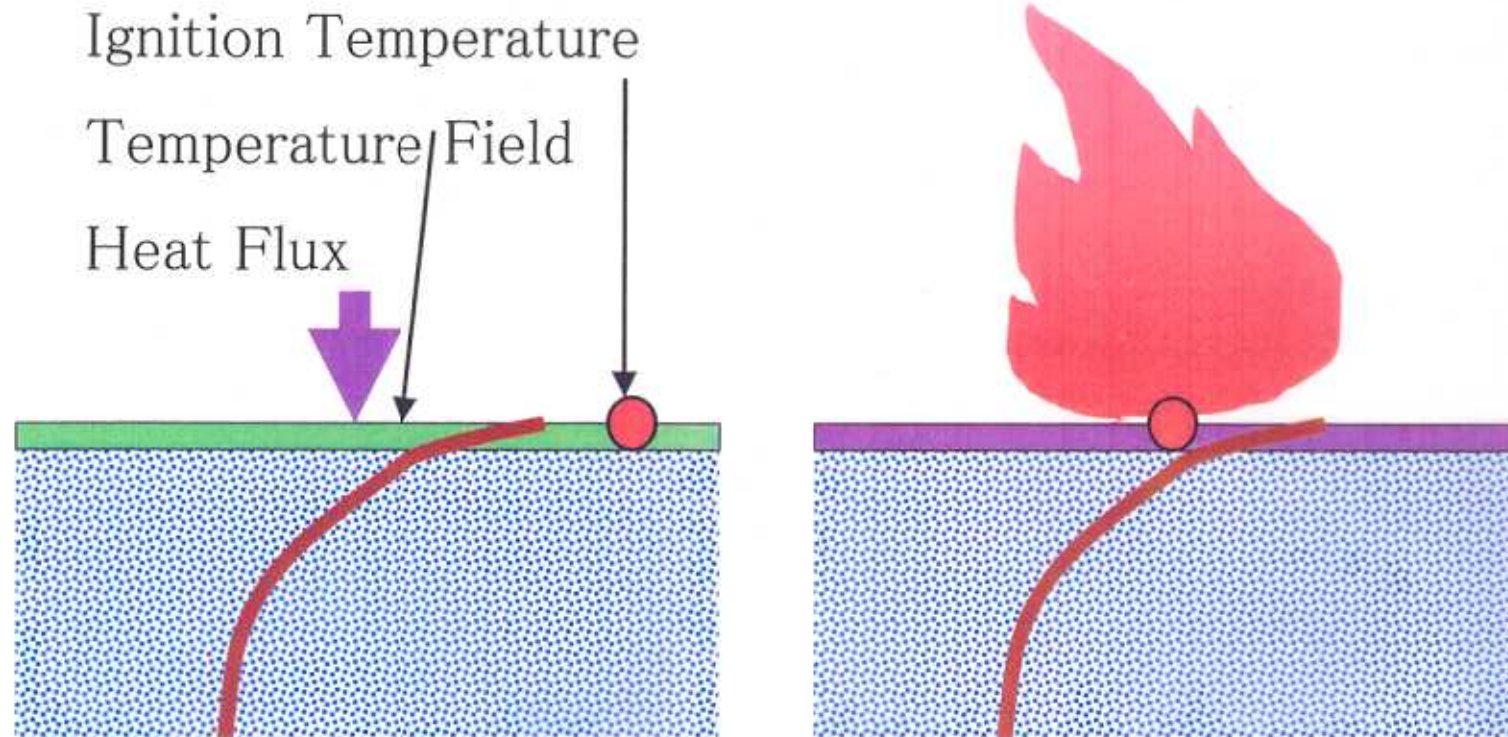
Time to Ignition under High Heat Flux

$$t_{ig} \propto (T_{ig} - T_o)^2 / q''_e{}^2$$



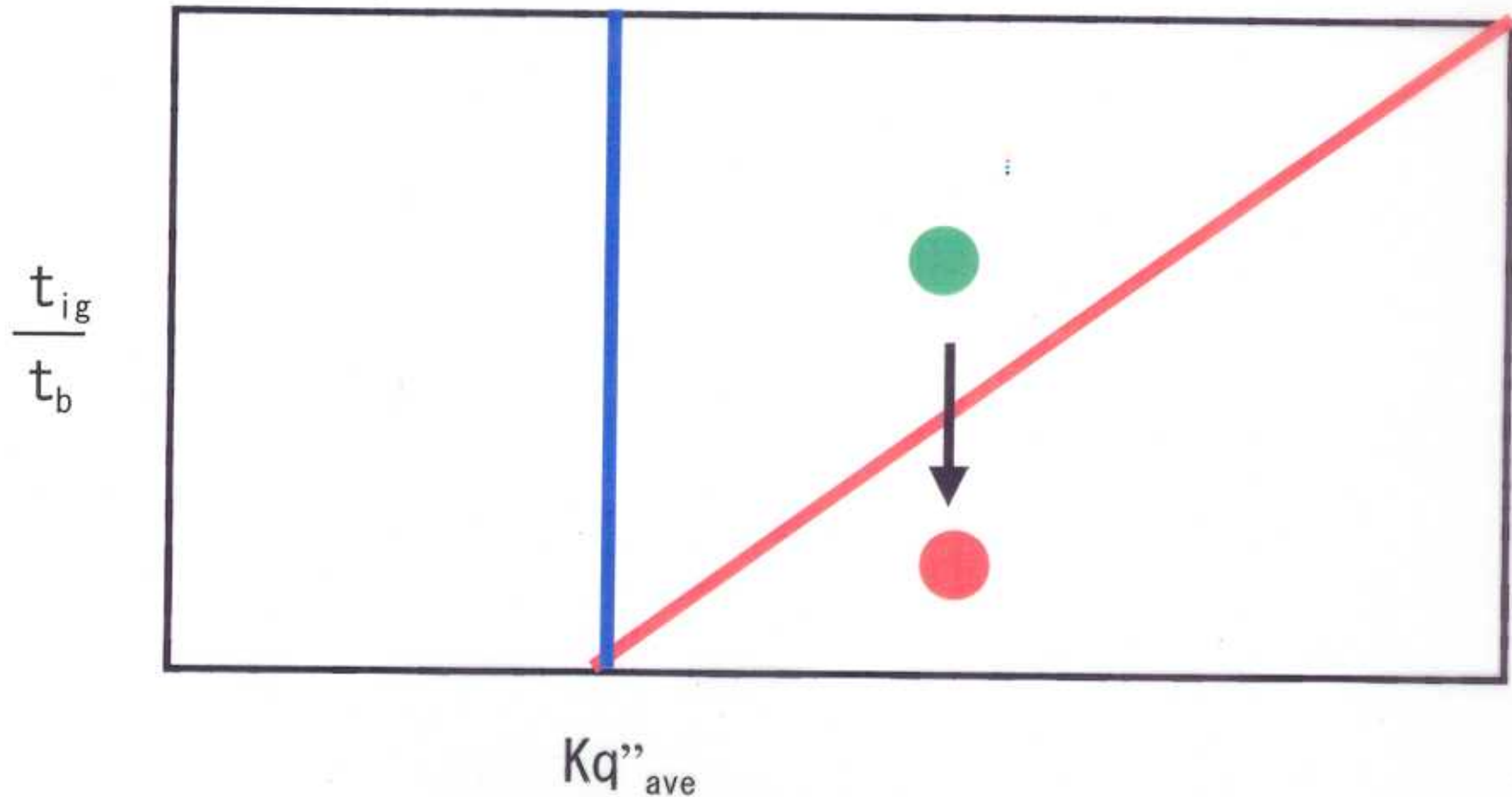
Time to ignition is sensitive to the difference between the ignition temperature and the initial surface temperature.

WALL PAPER ON INORGANIC MATERIAL



Temperature field is dictated by the inert slab. Time to ignition is then determined by the ignition temperature of wall paper.

Flashover-safe lining material may cause flashover after preheating from the smoke layer.



Importance of Ignitability of Interior Linings

Ignitability may be the key for the occurrence of flashover in 10 – 20 min in ISO9705 Room Corner Test.

Flame spread beneath Ceiling may be dominated by the ignitability of the ceiling material.

Parametric study could be made using zone type models (Quintiere, Karlsson etc).

Conclusions and Needs of Further Study

Further study should be made on the heating condition of the wall and ceiling surfaces in Room Corner Tests.

Lining materials causing accelerated flame spread from the beginning will cause flashover in any fire scenario.

Lining materials causing flashover after a weak burning for several – 10 min may offer interesting opportunities for new scenarios for flashover.