Non-binding Research Agreement

EXPERIMENTAL RESEARCH ON SPREAD OF FIRE TO ADJACENT RESIDENTIAL AREA CAUSED BY FIREBRANDS FROM BURNING RESIDENTIAL BUILDINGS

1. OUTLINE

When multiple fires break out just after a large earthquake, ordinary fire fighting fails to bring the entire fire under control. Those fires left out of control spread to next-door buildings resulting in urban fires. Many flying firebrands cause additional fires around residential buildings away from the origin. The influence of flying firebrands is particularly large under a strong wind. For instance, in the Great Kanto Earthquake, 63 origins of fire out of 153 were caused by flying firebrands. As firebrands go through the long process of its occurrence, scatter and ignition in the strong wind, the experiment on firebrands is difficult and the research is behind. The flying firebrands which spread fire to adjacent residential area cause troubles in a forest fire as well. Though the research on the flying firebrands is performed in the United States, there is no great difference between Japan and United States regarding the situation.

Against the backdrop of the above, The Building Research Institute, an Incorporated Administrative Agency, Japan (hereinafter referred to as "BRI") and the National Institute of Standards and Technology, Building Fire Research Laboratory (hereinafter referred to as "BFRL-NIST"), an agency of the United States Government, conducted collaborative research on "Preventive Measures against Fire Extension to Adjacent Residential Area caused by Firebrands from Forest Fire or the Like"(From 1st September 2006 to 31st March 2009). In the collaboration, the firebrands from burning trees were simulated and the research on the influence of firebrands to roofing and ventilating openings, which are considered as vulnerable based on the factual research, was conducted under a strong wind.

In this new collaboration, the firebrands from burning residential building will be simulated. As before, the influence of firebrands to roofing and ventilating openings will be researched under a strong wind.

2. WORKING PLAN

(1) Simulation of firebrands from burning residential buildings

Revision of the firebrand generator which was used in the last collaboration and simulation of large scale firebrands caused by burning residential buildings.

(2) Experiment on the influence of firebrands to adjacent residential buildings

Roofing and ventilating openings will be exposed to firebrands that the firebrand generator will spout out.

3. PERIOD OF COLLABORATIVE RESEARCH

The period of collaborative research shall be from date of signing to March 31, 2012.

4. BRI RESPONSIBILITIES:

BRI will accept Dr. Samuel L. Manzello of BFRL-NIST who conducts experiments using its FWT (Fire Wind Tunnel Facility) while he stays in Japan.

5. BFRL-NIST RESPONSIBILITIES:

All the experiments related to this plan will be conducted by Dr. Samuel L. Manzello of BFRL-NIST and Dr. Yoshihiko Hayashi of BRI.

6. NON-BINDING:

This Agreement is a statement of intent of the parties to collaborate in the described areas. This Agreement is not legally binding upon both parties and does not create any legal rights or responsibilities. This Agreement shall not be the basis of any judicial proceeding between BRI and BFRL-NIST.

7. FUNDS:

Each party will bear the expense of conducting this collaborative research and not obligated to fund under this Agreement.

8. INTELLECTUAL PROPERTY

During the period of collaborative research, execution of any patentable intellectual property concerned with this collaboration is not expected. However, if new technology which is patentable under Japanese or American law is developed, then its application for a patent, proprietary right and license will be determined to occur or not.

9. BRINGING-IN OF EXPERIMENTAL APPARATUS:

In necessity for the collaborative research, BRI and BFRL-NIST are allowed to bring experimental apparatus to other parties and to utilize experiment facilities of other parties. In this case, the cost of the shipment and utilization should be borne by the party owing the apparatus.

10. REPORTING:

Joint publications will be prepared by both parties. Both party will exchange the detailed data if need be. Regarding publication of research findings, each party will be responsible to satisfy each own institutional policies.

11. ALTERATION OF THE WORKING PLAN

The alteration of the working plan, the Agreement and others are to be made on new agreement after consultation between BRI and BFRL-NIST.

12. DISPUTES, TERMINATION:

Disagreements or disputes arising under this Agreement, if any, shall be resolved through amicable discussion. When BRI or BFRL-NIST finds difficulty to continue the collaborative research, either party may terminate this Agreement upon 30 days written notice to the other party after the consultation between both.

As a token of this Agreement by both parties, two documents in duplicate in ~~Japanese and~~ English language are made to be respectively in custody.

April 1, 2009

Shuzo Murakami

Dr. Shuzo Murakami
Chief Executive
Building Research Institute (BRI)
Japan

S. Shyam Sunder 12/4/09

Dr. S. Shyam Sunder
Director
Building and Fire Research Labo. (BFRL)
National Inst. Stands. & Tech. (NIST)
U.S.A.

Collaborative Research Plan

1. RESEARCH SCHEDULE

Research Items	Assignments		Yearly Plan (Japanese Fiscal-Year Base)		
	BRI	BFRL-NIST	2009/4-	2010/4-	2011/4-
(1) Simulation of firebrands from burning residential buildings	○	○	********	****	
(2) Experiment on the influence of firebrands to adjacent residential buildings	○	○	****	*******	****

2. RESEARCHER AND STAFF IN CHARGE

Name	Position
Yoshihiko Hayashi	Chief Research Engineer, BRI
Ichiro Hagiwara	Chief Research Engineer, BRI
Hideaki Masuda	Senior Research Engineer, BRI
Hideki Yoshioka	Research Engineer, BRI
Samuel L. Manzello	Mechanical Engineer, BFRL
William Mell	Applied Mathematician, BFRL
Alexander Maranghides	Fire Protection Engineer, BFRL

3. PLACE FOR THIS COLLABORATIVE RESEARCH

(1) Building Research Institute, Japan

(2) National Institute of Standards and Technology/Building Fire Research Laboratory, U.S.A.