

## Pressure Drop Sensitivity Analysis of the Top Nozzle Flow Plate of PWR Fuel Assembly

150

가 3  
 FLUENT 1/8  
 Ligament , 가

### Abstract

A pressure drop sensitivity analysis was performed for the development of top nozzle flow plate of PWR fuel assembly. The three kinds of candidate model were selected for the development of top nozzle flow plate. The analytical models were generated for the 1/8 size of top nozzle plate using the FLUENT code for sensitivity analysis. The analysis range of thickness of flow plate, ligament width and inlet chamfer angle was determined based on the dimensions of the current flow plates of top nozzle in the PWR fuel assembly. The pressure drop characteristics of each candidate model was optimized by performing sensitivity analysis

1.

가 3

가

3

Ligament

가

FLUENT V5.0<sup>[1]</sup> Code

1

3

A

Type

Checker

가

, B Type

A Type

가

2

. C Type

1 I Type

가

## 2.

가 3

가

가

가

FLUENT V5.0 GAMBIT V1.3

가 I.E. Idelchik<sup>[2]</sup>가

가

### 2.1

FLUENT Code Preprocessor

GAMBIT

V1.3

2

1/8

3

Tet/Hybrid

Velocity Inlet

Outflow

### 2.2

3

1

#### 2.2.1

1 14.22 ~ 19.18 mm 가 .  
가 10, 12, 14, 16mm 4

2.2.2 Ligament

1 Ligament 2.54 ~ 4.0 mm 가 .  
가 2.5, 3.0, 3.5 mm 3 Ligament

2.3

FLUENT Code ,

가 SIMPLE Algorithm<sup>[3]</sup>, Standard  $\kappa$ - $\epsilon$  Turbulent  
model, Standard wall function ,  
3 , 가 2250 psia,  
650 5 m/s,  
650 °F 10 %

3. 가

3 3  
4 가 .  
Ligament 가 5  
, 3 가 Ligament C Type 가  
, Ligament  
6 , Ligament 2.5mm 가  
7 10mm, Ligament 2.5mm 가 C Type  
가  
가 Rounded Chamfer 가  
[3] , Chamfer 가 35°~45° 가 가  
Chamfer,  
35°~45°, 10mm, Ligament 2.5mm 가 C Type  
가

Chamfer, 35°~45°, 16mm, Ligament 3.0mm C Type  
가 .

4.

Chamfer, 35°~45°, 10mm, Ligament 2.5mm C Type  
가 ,

16mm, Ligament 3.0mm C Type

가 .

Chamfer,

40°, 16mm, Ligament 3.0mm 가 C Type

가 .

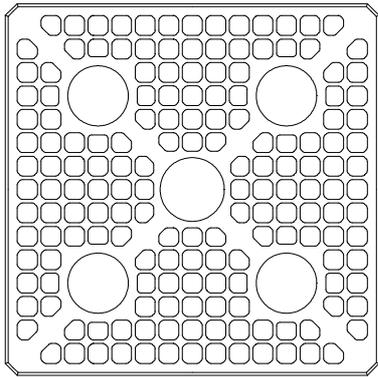
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1. FLUENT Incorporated, "FLUNET 5.0 User Guide Manual", USA.
2. I.E.Idelchik, "Handbook of Hydraulic Resistance", 3<sup>rd</sup> Edition, 1993.
3. S.V.Patankar, "Numerical Heat Transfer and Fluid Flow", University of Minnesota, 1980.

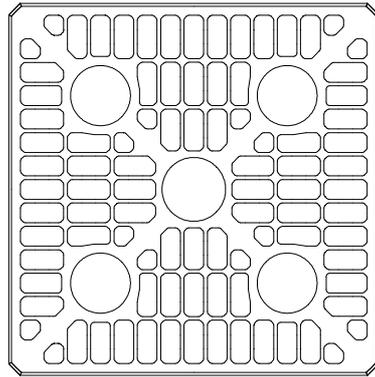
1.

: mm

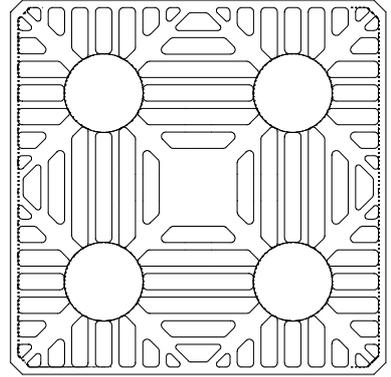
No		I	II	III	IV
1	Flow Plate Thickness	15.9	14.22	19.18	14.22
2	Ligament Width	4.0	3.429	2.261	2.54
3	Ligament Round Radius or Chamfer Angle	R: 1.22	A: 15° (30°)	A: 15° (30°)	A: 15° (30°)
4	Ligament Flat Length	2.03	2.229	1.061	1.34



(a) A Type

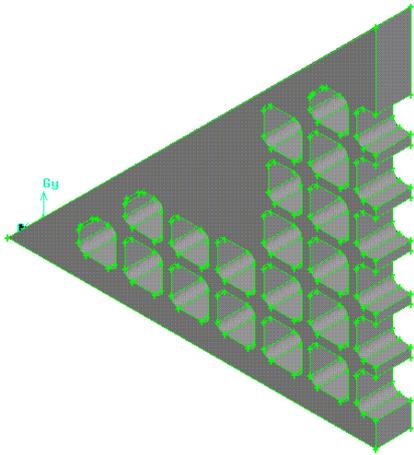


(b) B Type

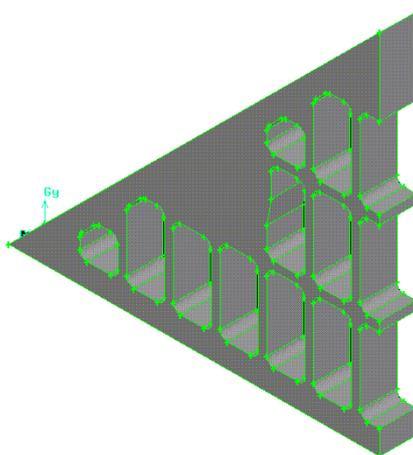


(c) C Type

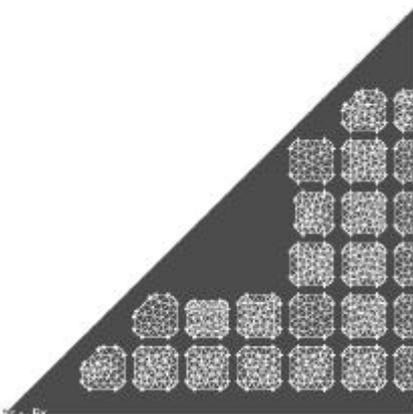
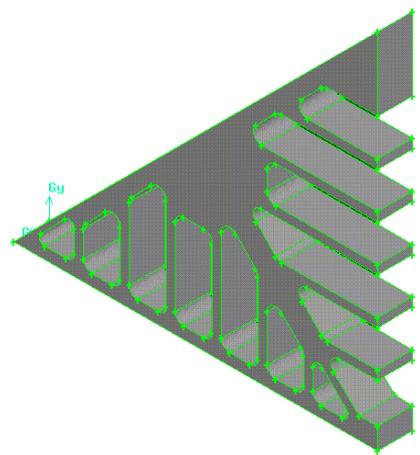
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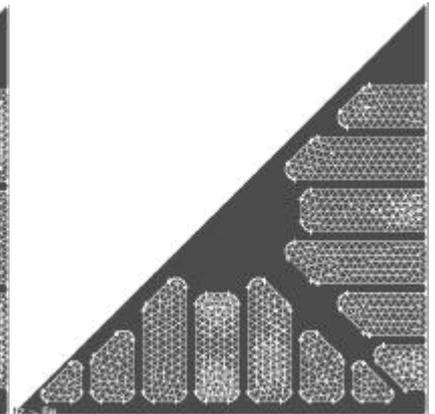
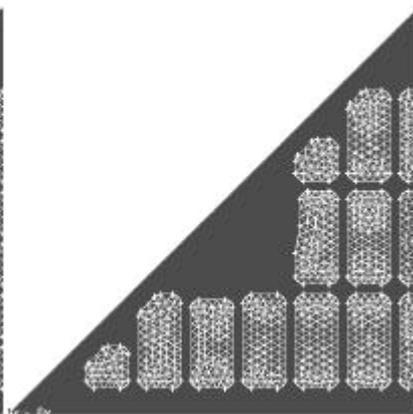
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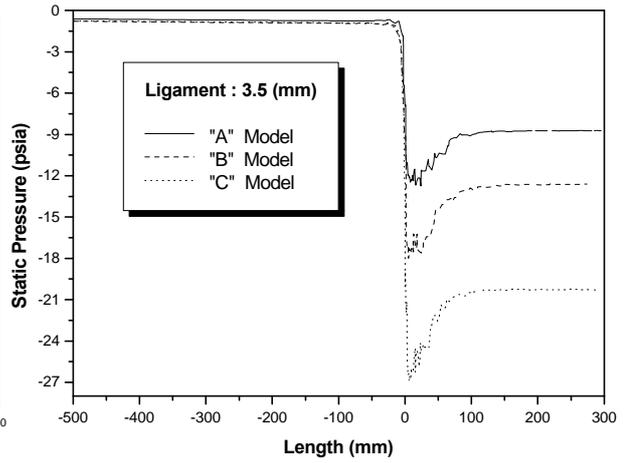
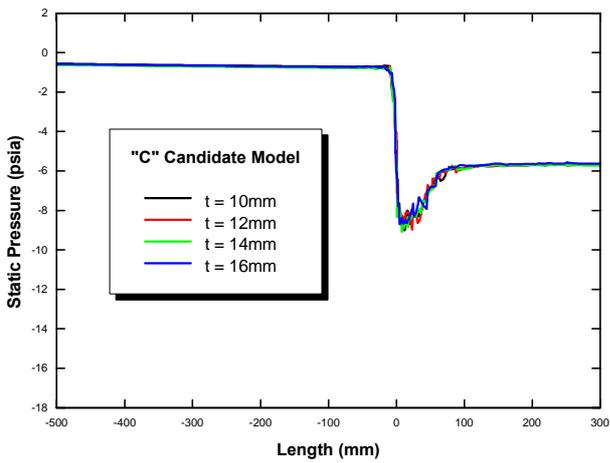
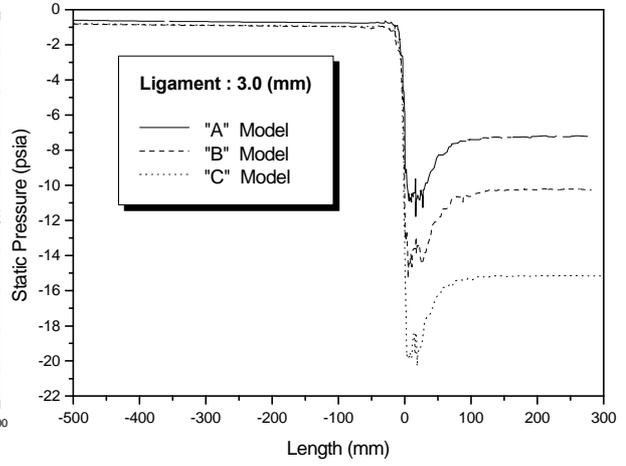
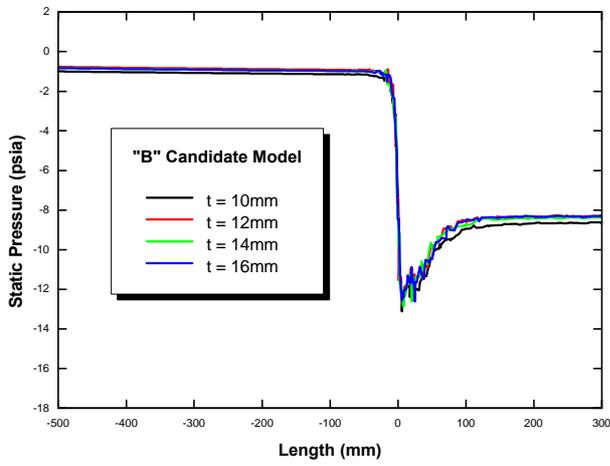
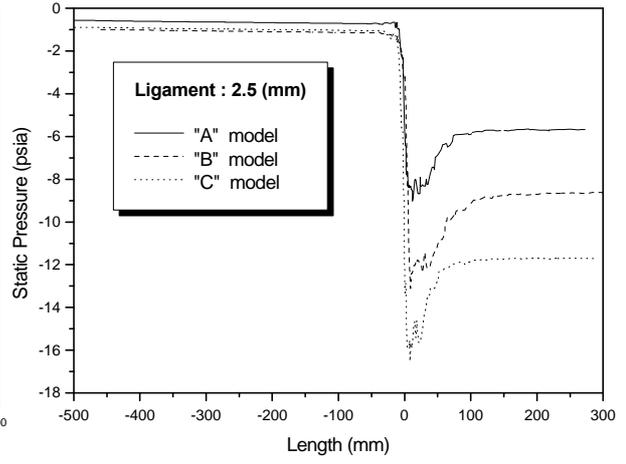
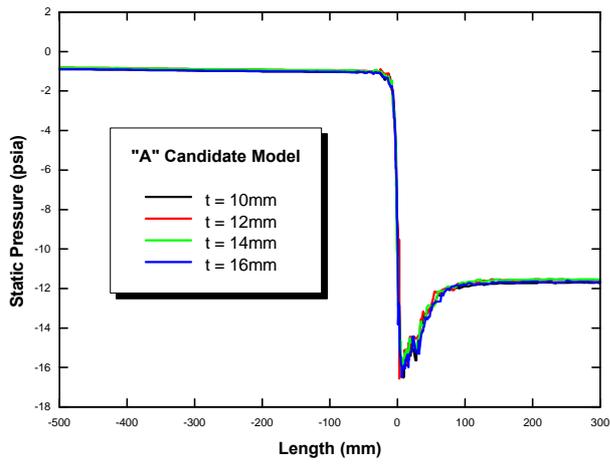


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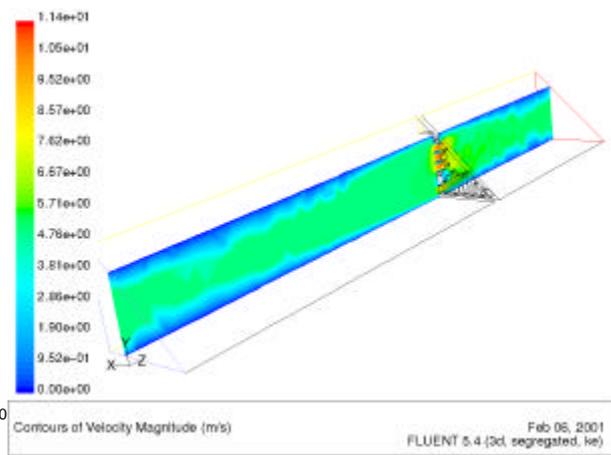
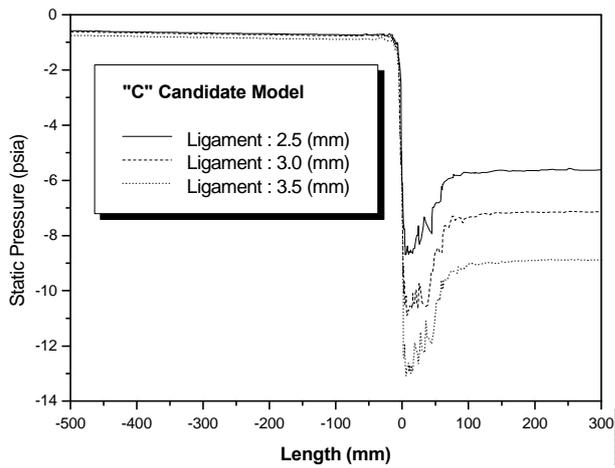
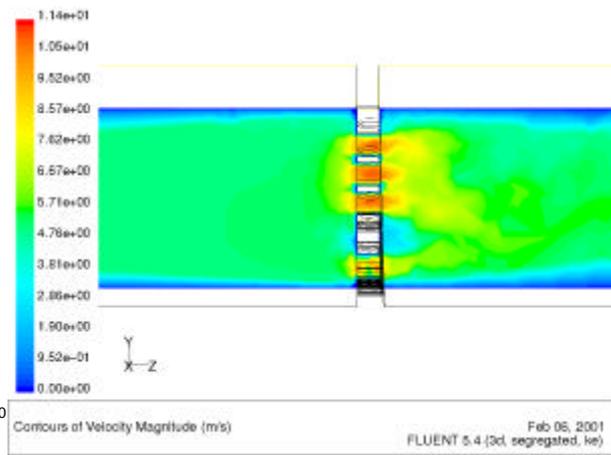
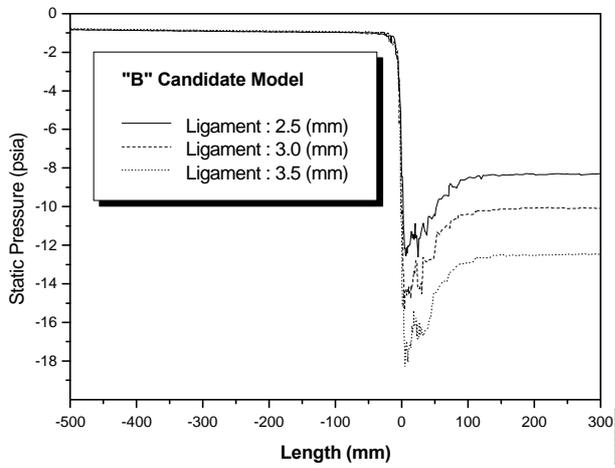
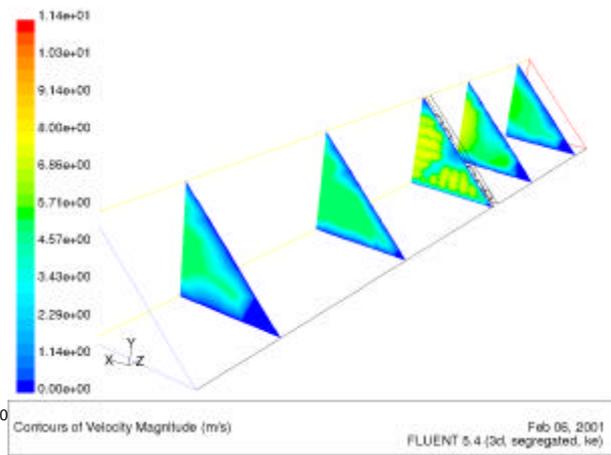
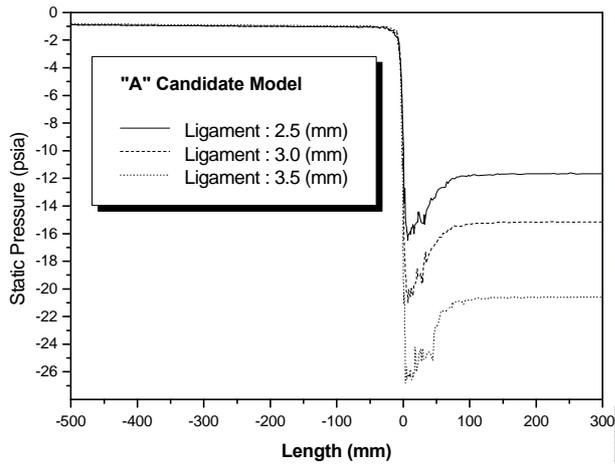
3.





4.

5. Ligament 가



6.  
Ligament

7. C Type