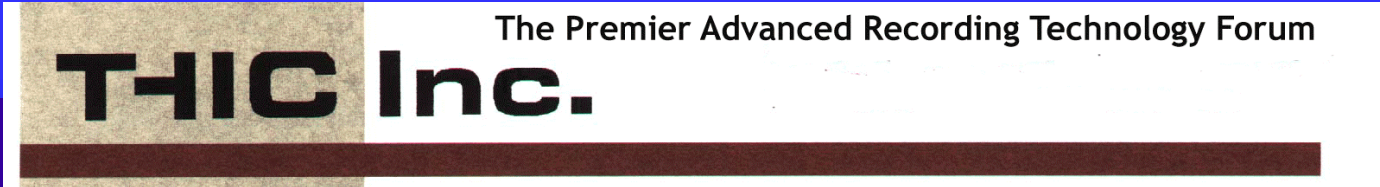


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Optimization of Head/Tape Interface

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on January 17, 2001

2/20/2001

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Numerical Optimization of Magnetic Tape Heads

Jiasheng Zhu and Prof. F. E. Talke

**Center for Magnetic Recording Research
UC, San Diego**

Outline

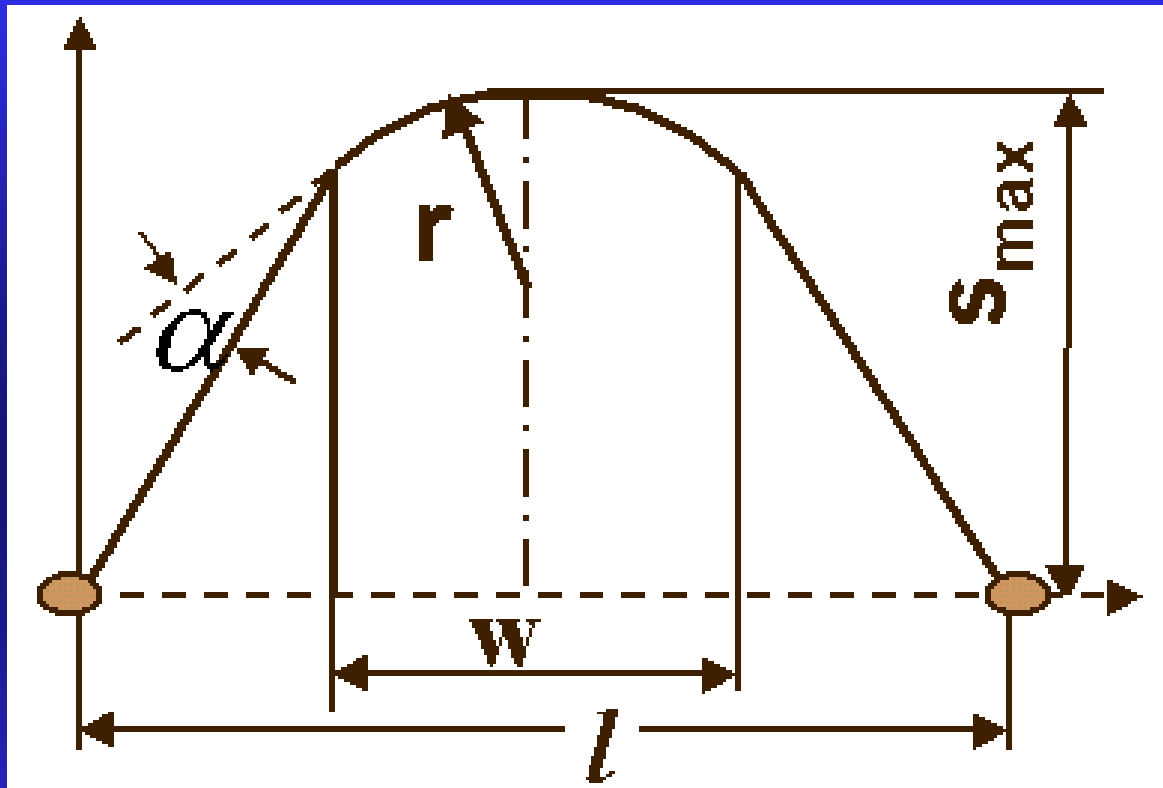
- **Optimal design of single, double, triple module head**
- **Effect of head design parameters on head/tape spacing and contact pressure**
- **Effect of head/tape interface parameters**
- **Summary**

Optimal Design of Single, Double and Triple Module Head

Optimization criteria

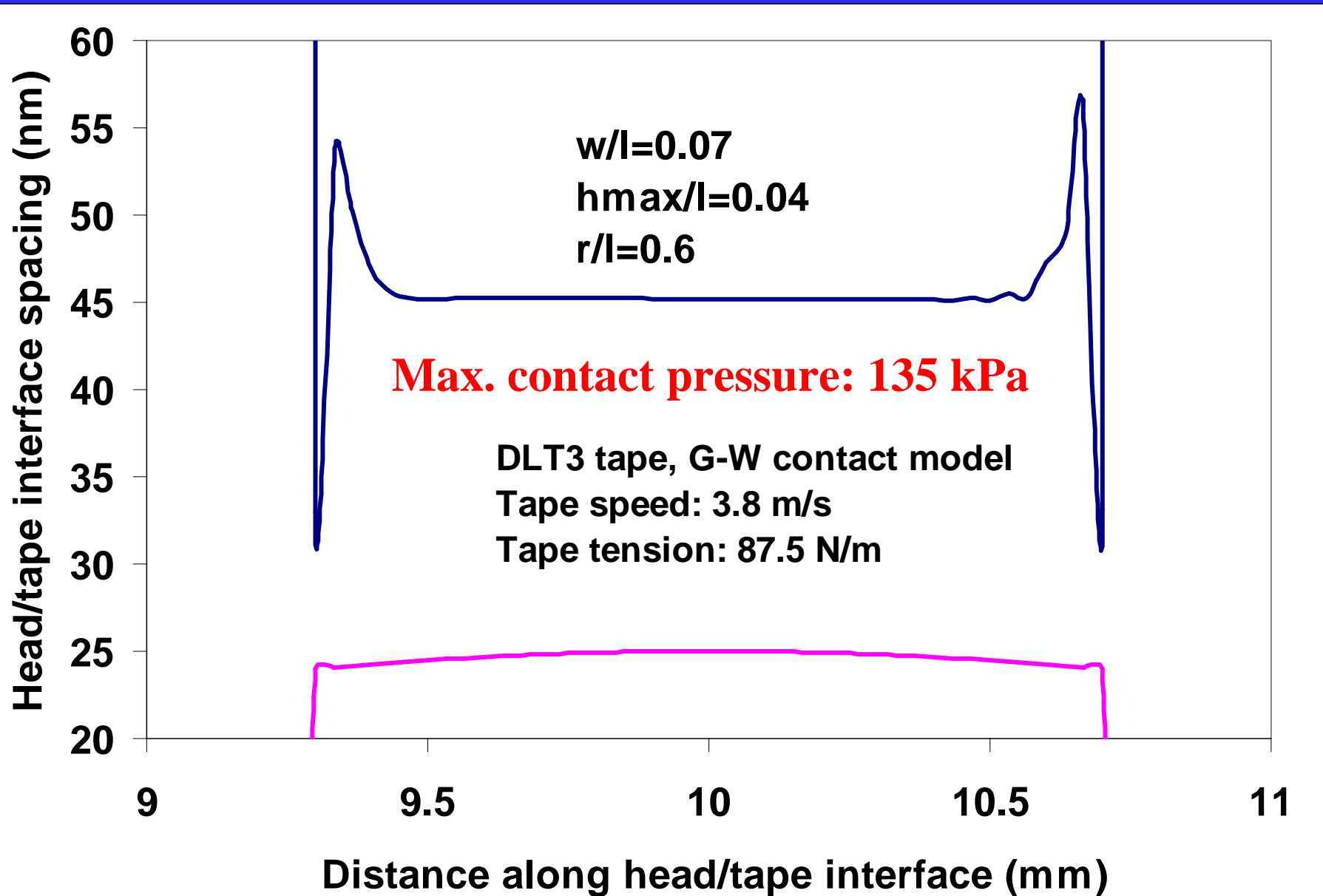
Minimize the head/tape spacing

Design parameters---single module head

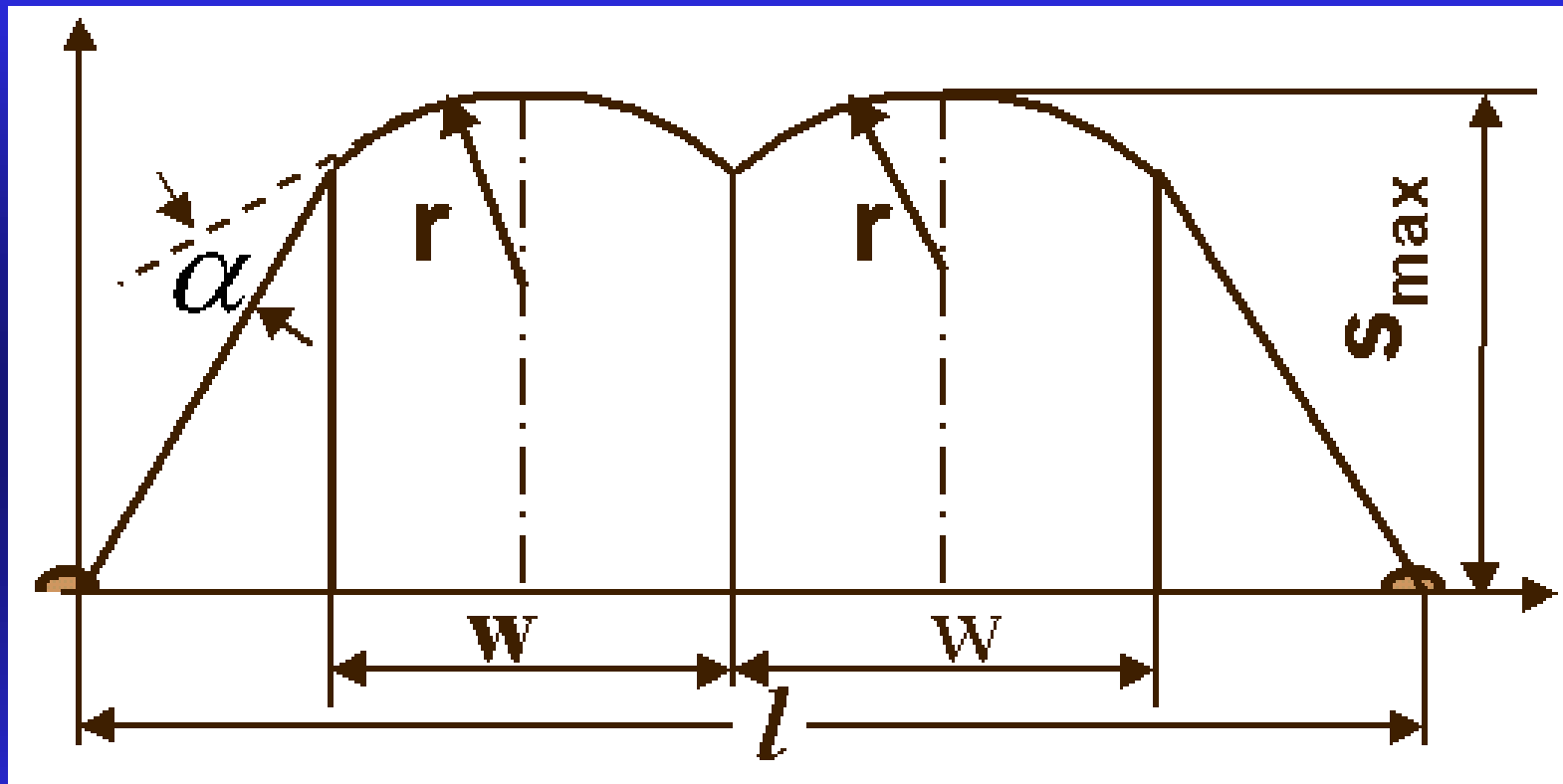


Normalized design parameters:
 $r/l, w/l, s_{\max}/l$

Optimal design----- single module head

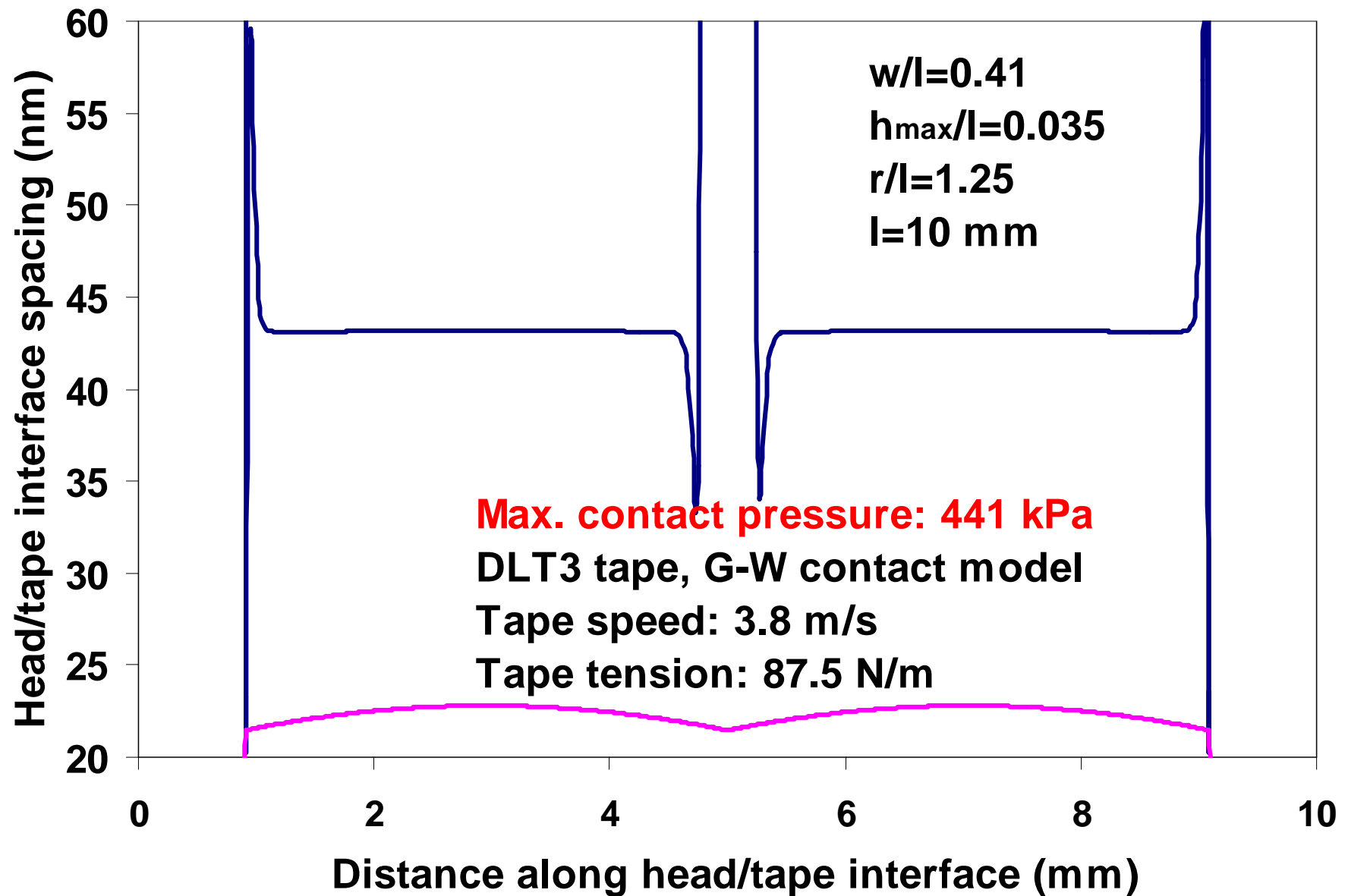


Design parameters----double module head

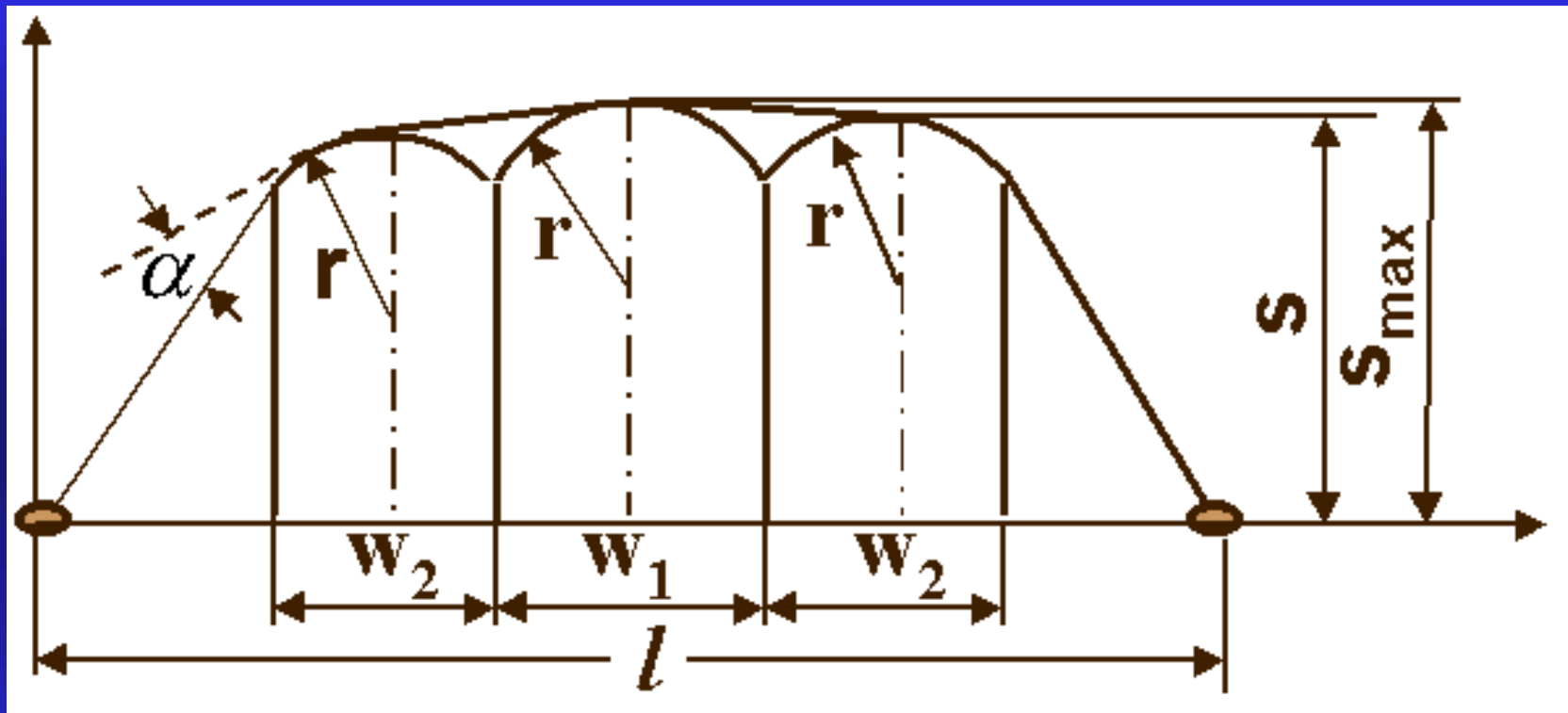


Normalized design parameters:
 $r/l, w/l, S_{max}/l$

Optimal design-----double module head



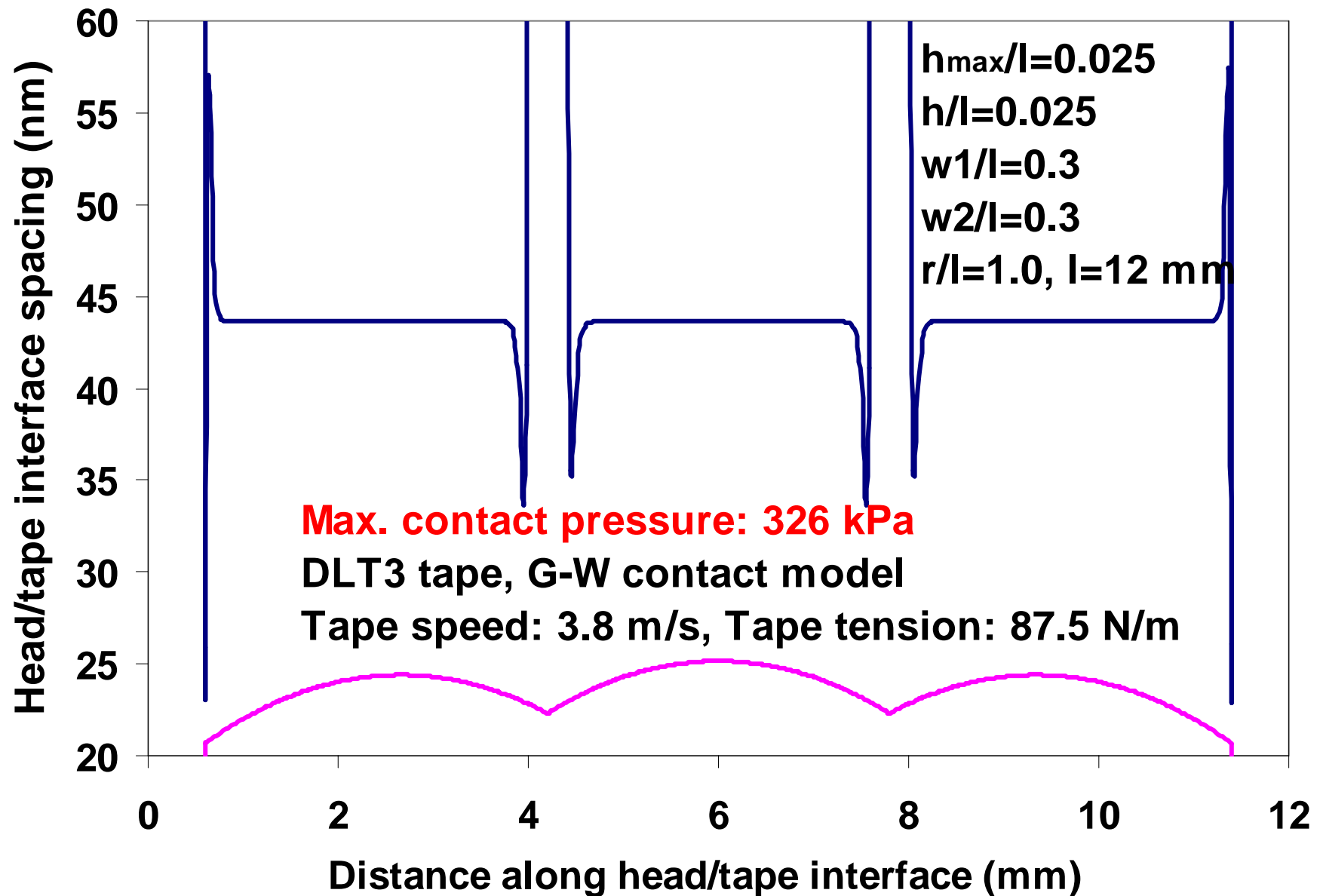
Design parameters---- triple module head



Normalized design parameters:

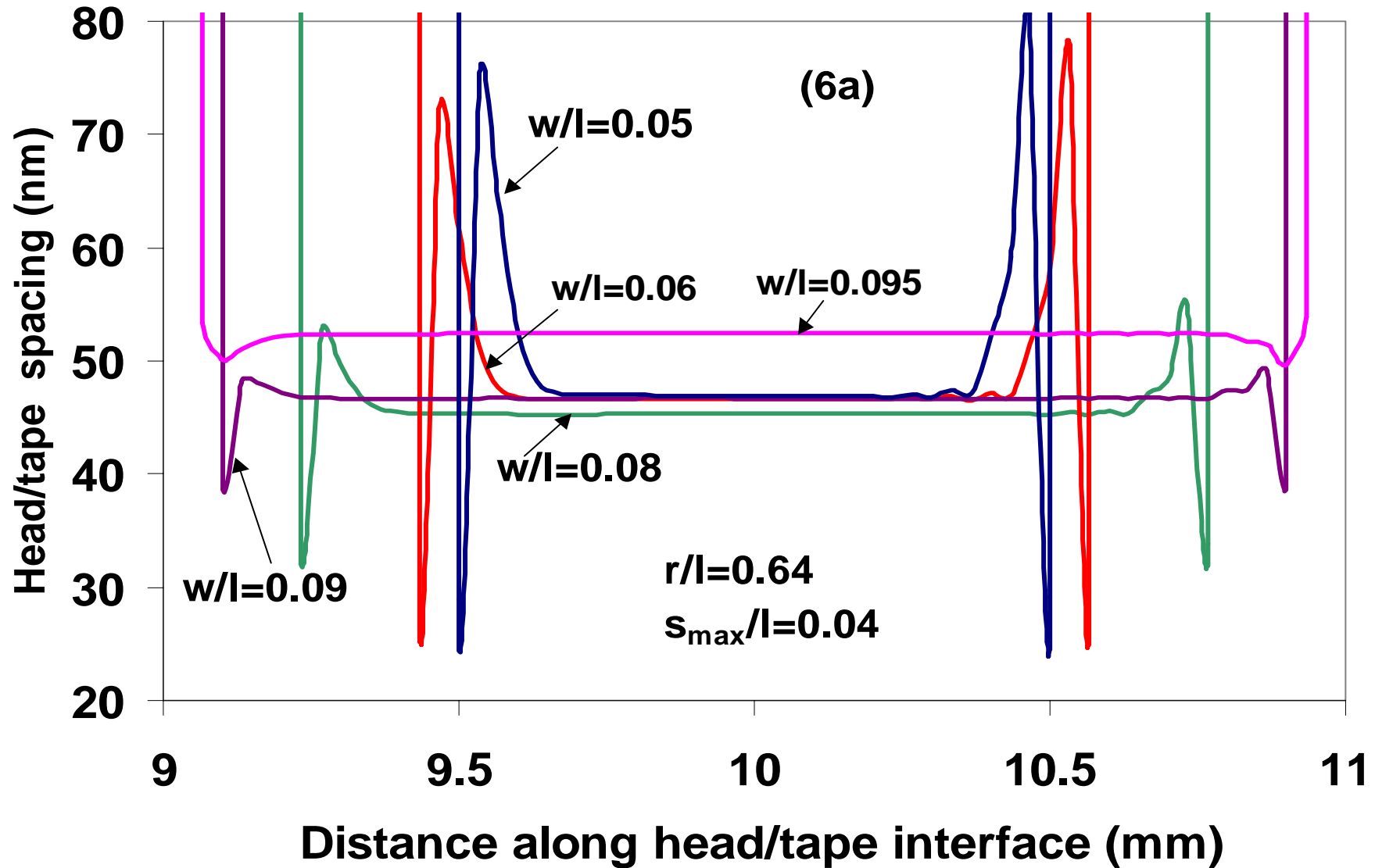
$$r/l, w_1/l, w_2/l, h/l, h_{\max}/l$$

Optimal design----- triple module head

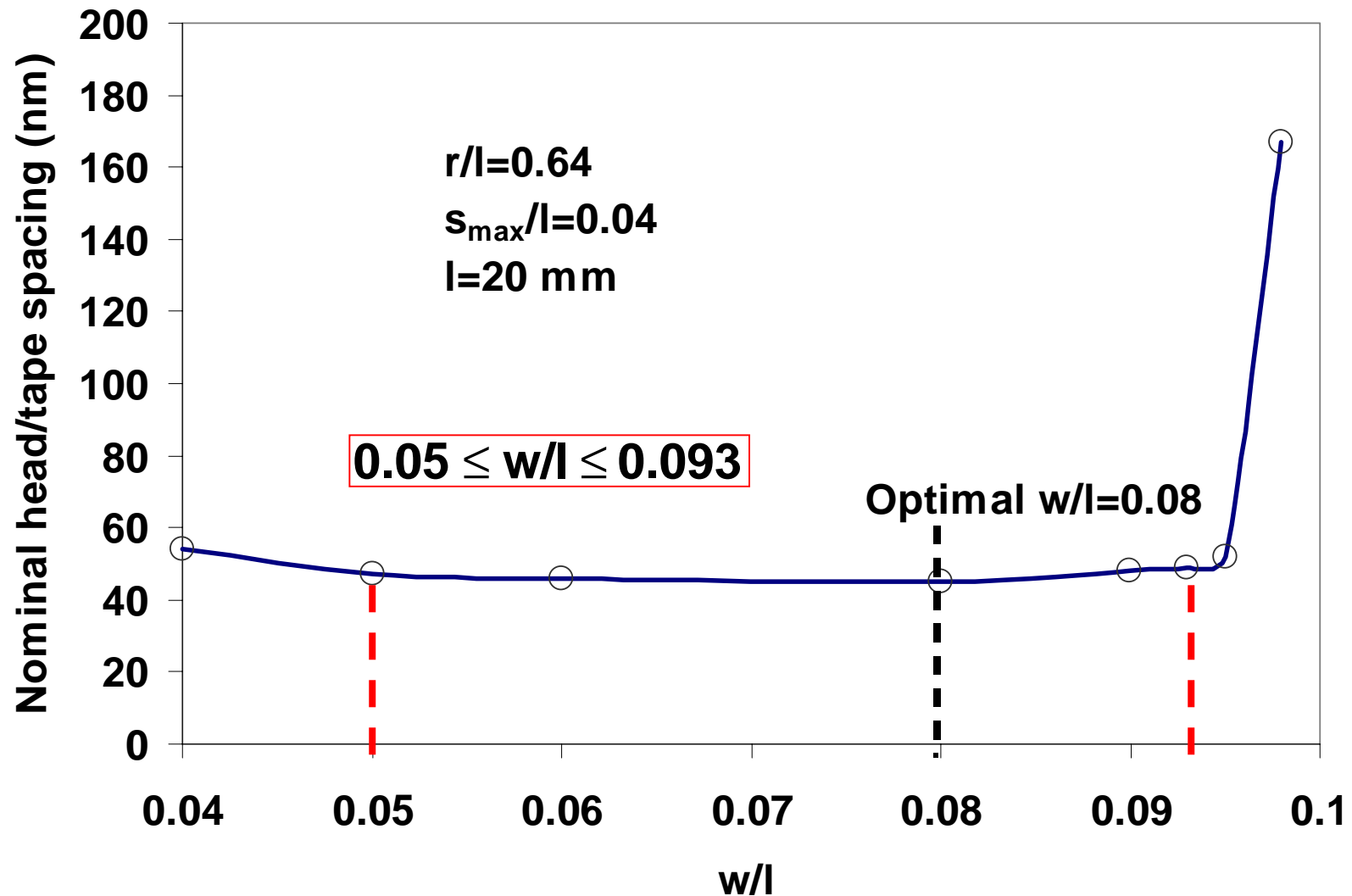


**Effect of head dimensional parameters
on head/tape spacing and contact
pressure**

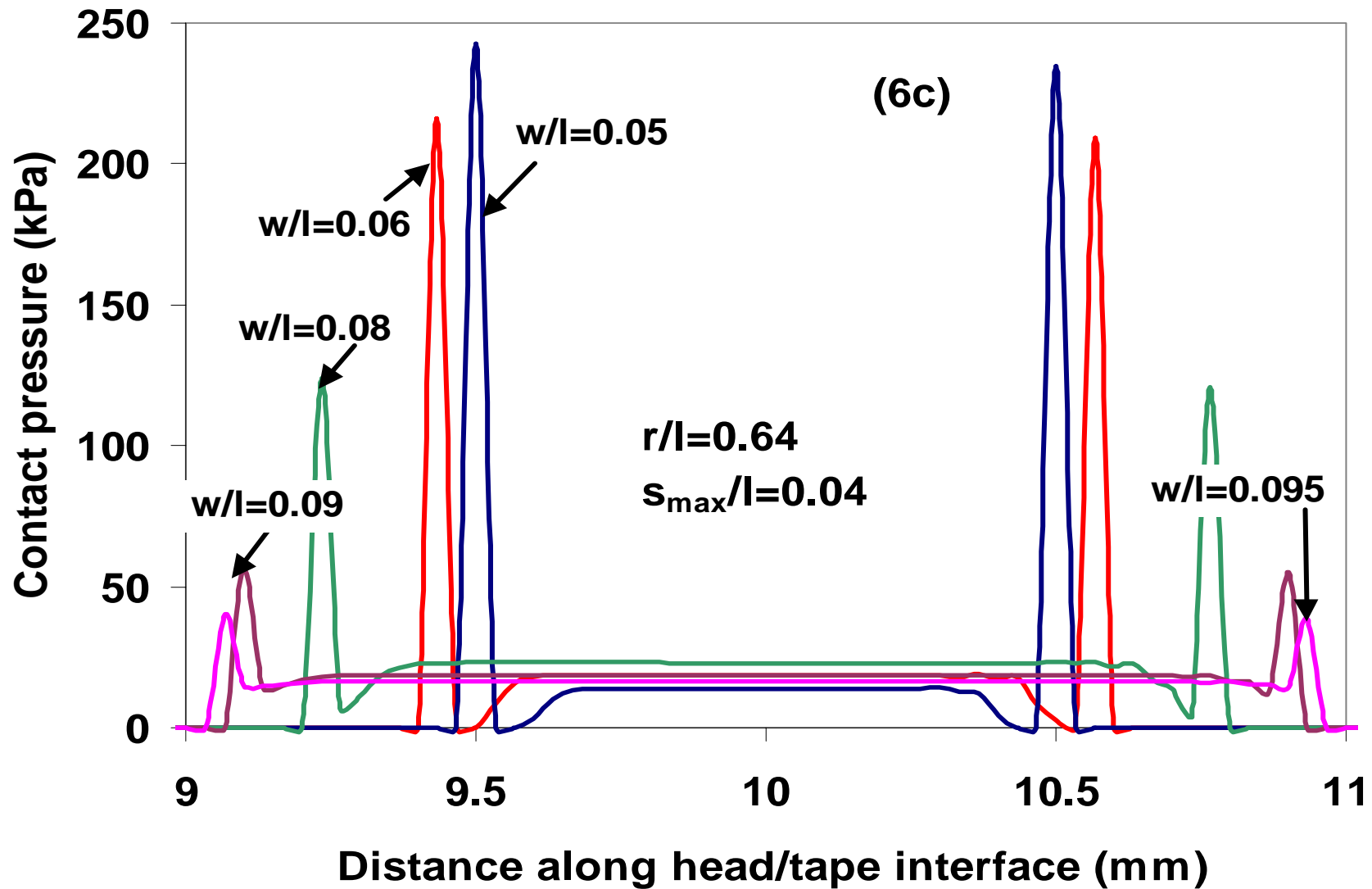
Effect of w on head/tape spacing distribution



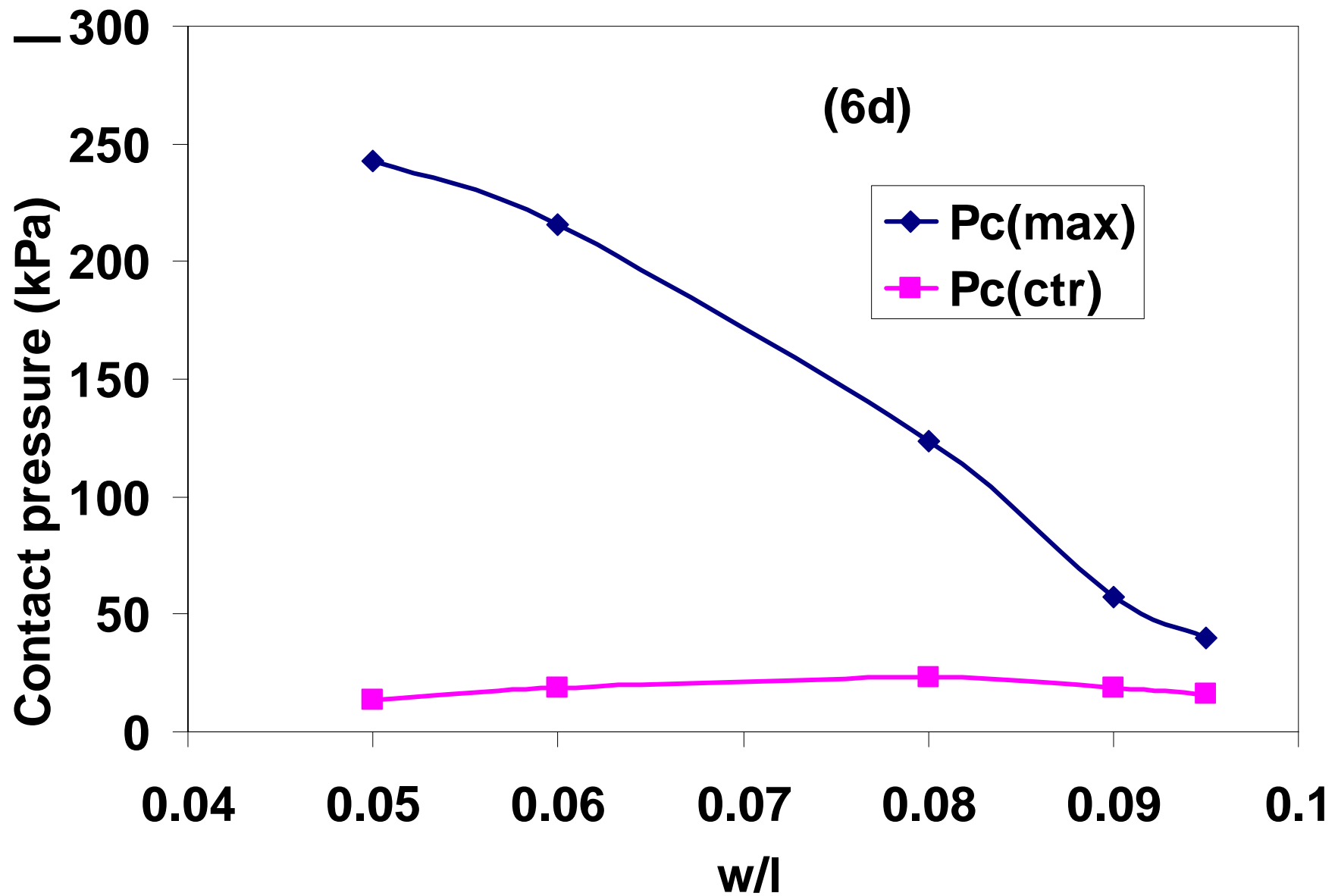
Effect of w on uniform head/tape spacing



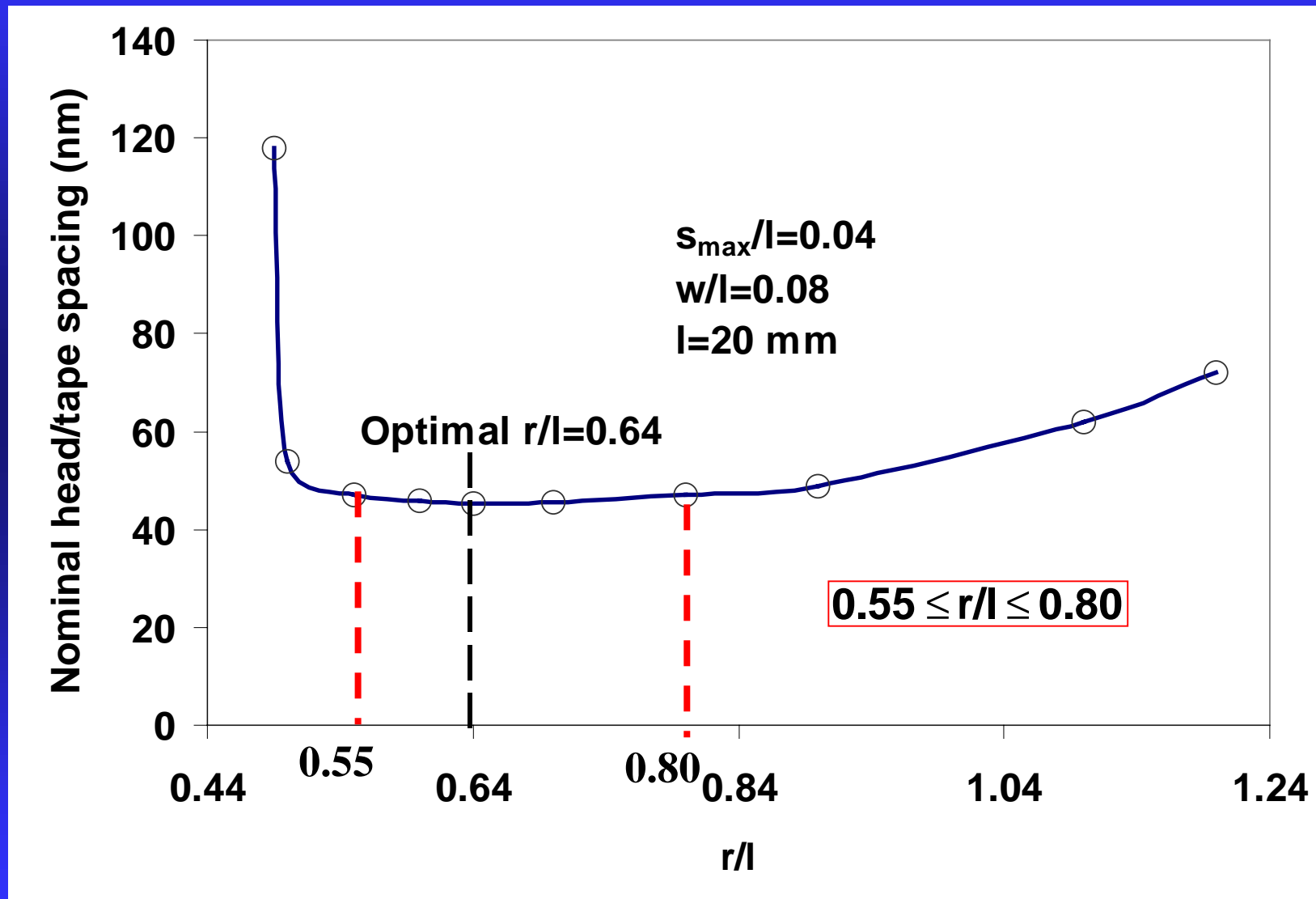
Effect of w on contact pressure distribution



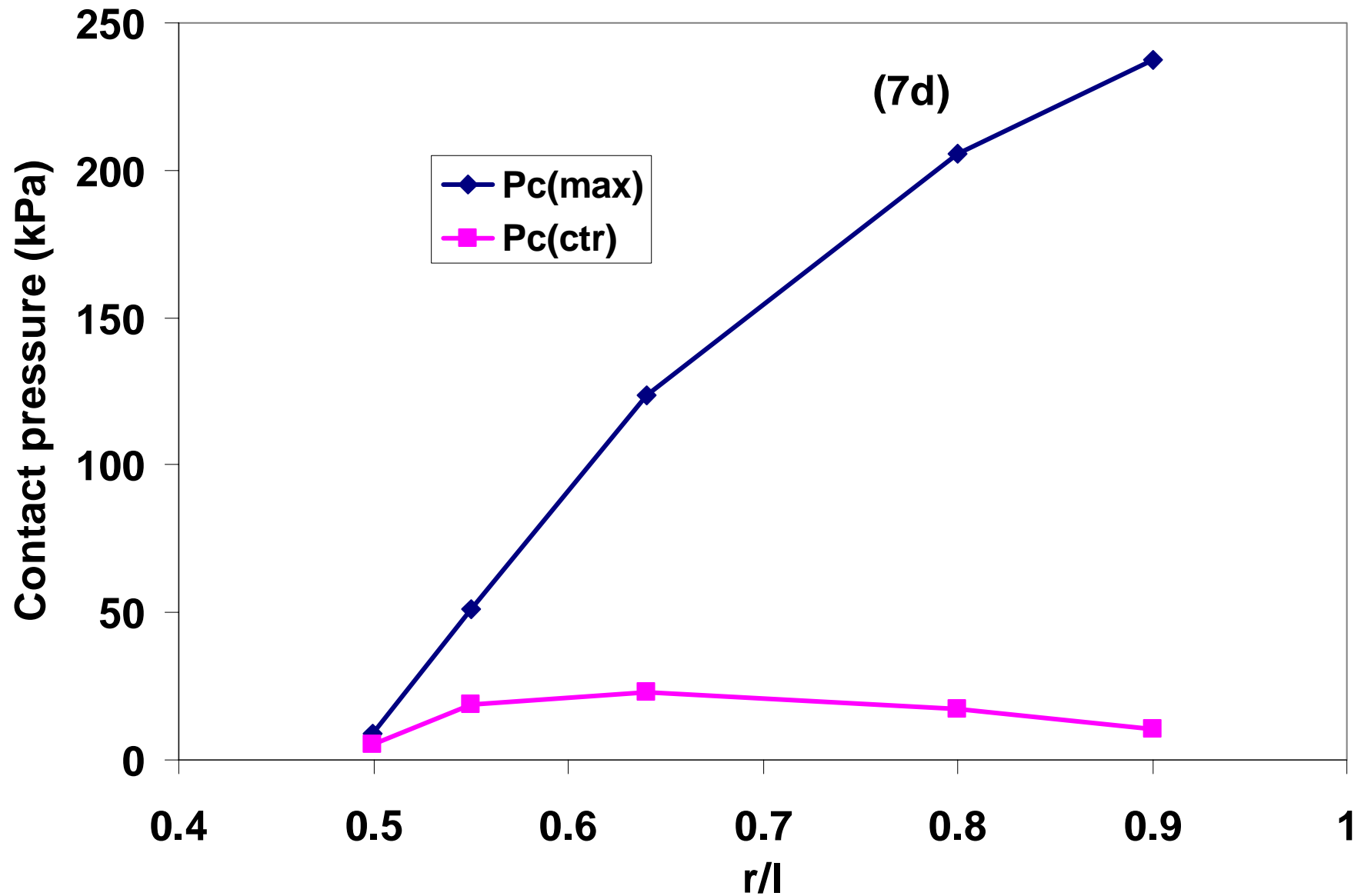
Effect of w on $p_c(\text{max})$ and $p_c(\text{ctr})$



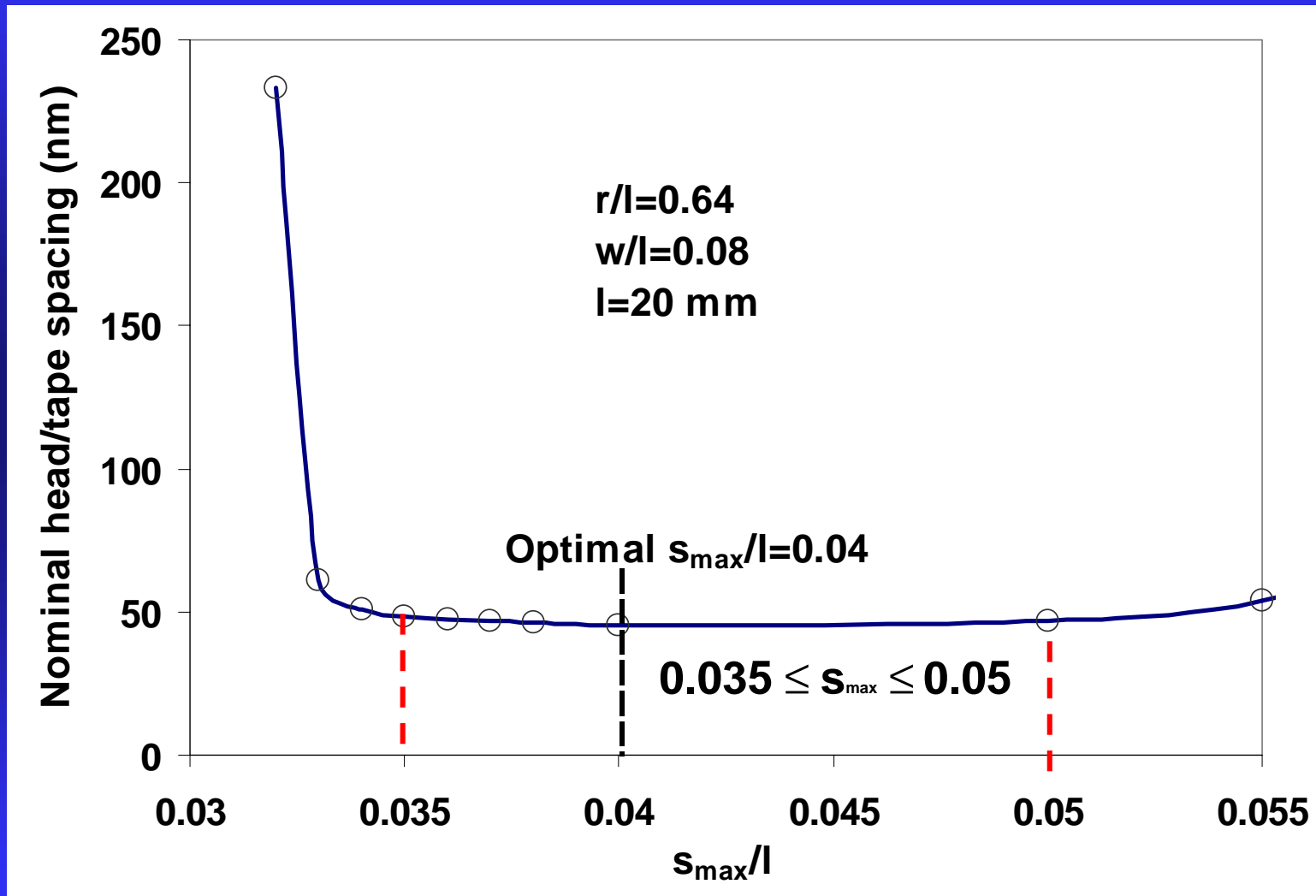
Effect of r on uniform head/tape spacing



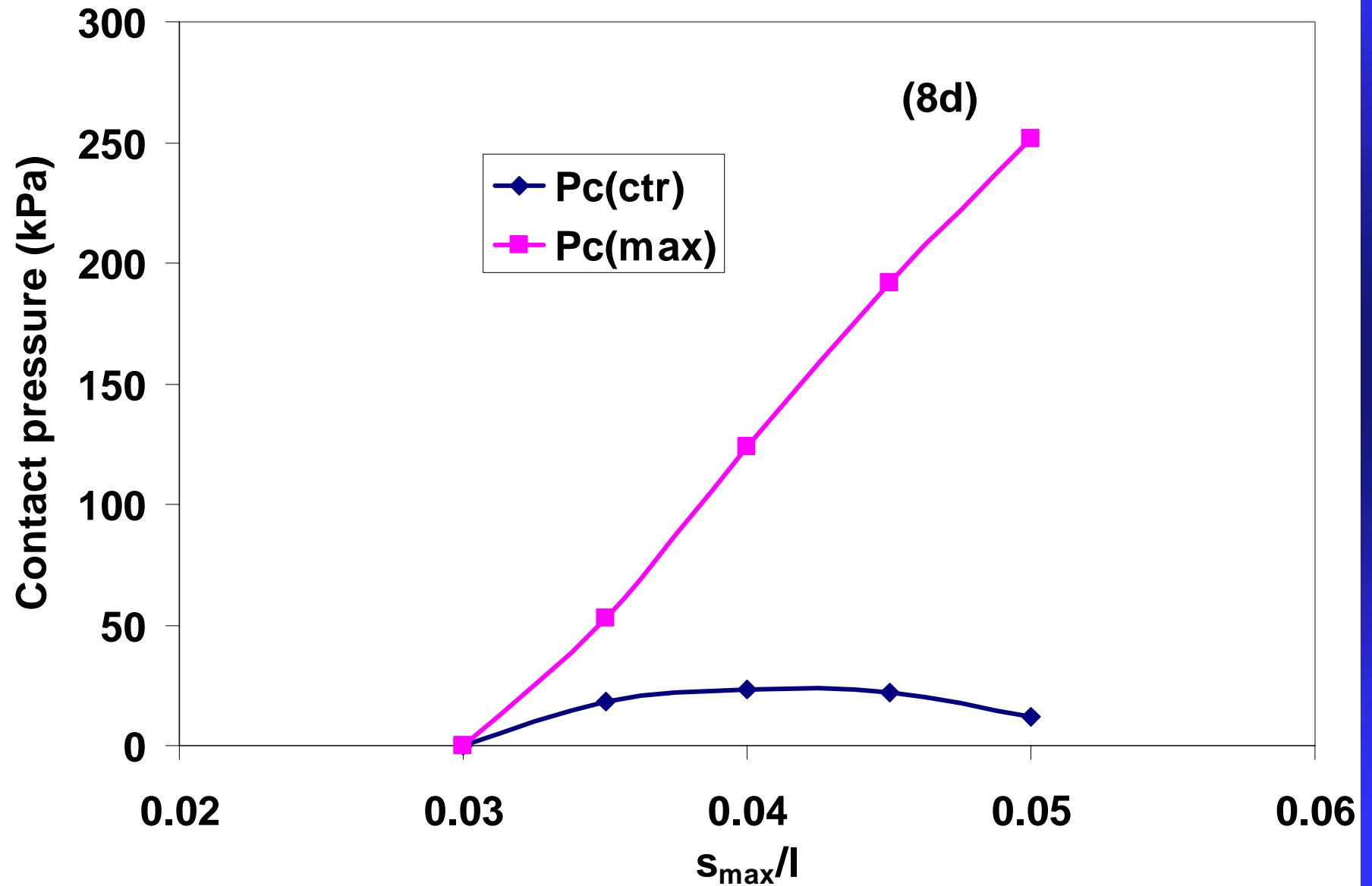
Effect of r on $p_c(\text{max})$ and $p_c(\text{ctr})$



Effect of s_{\max} on uniform head/tape spacing



Effect of s_{\max} on $p_c(\max)$ and $p_c(\text{ctr})$

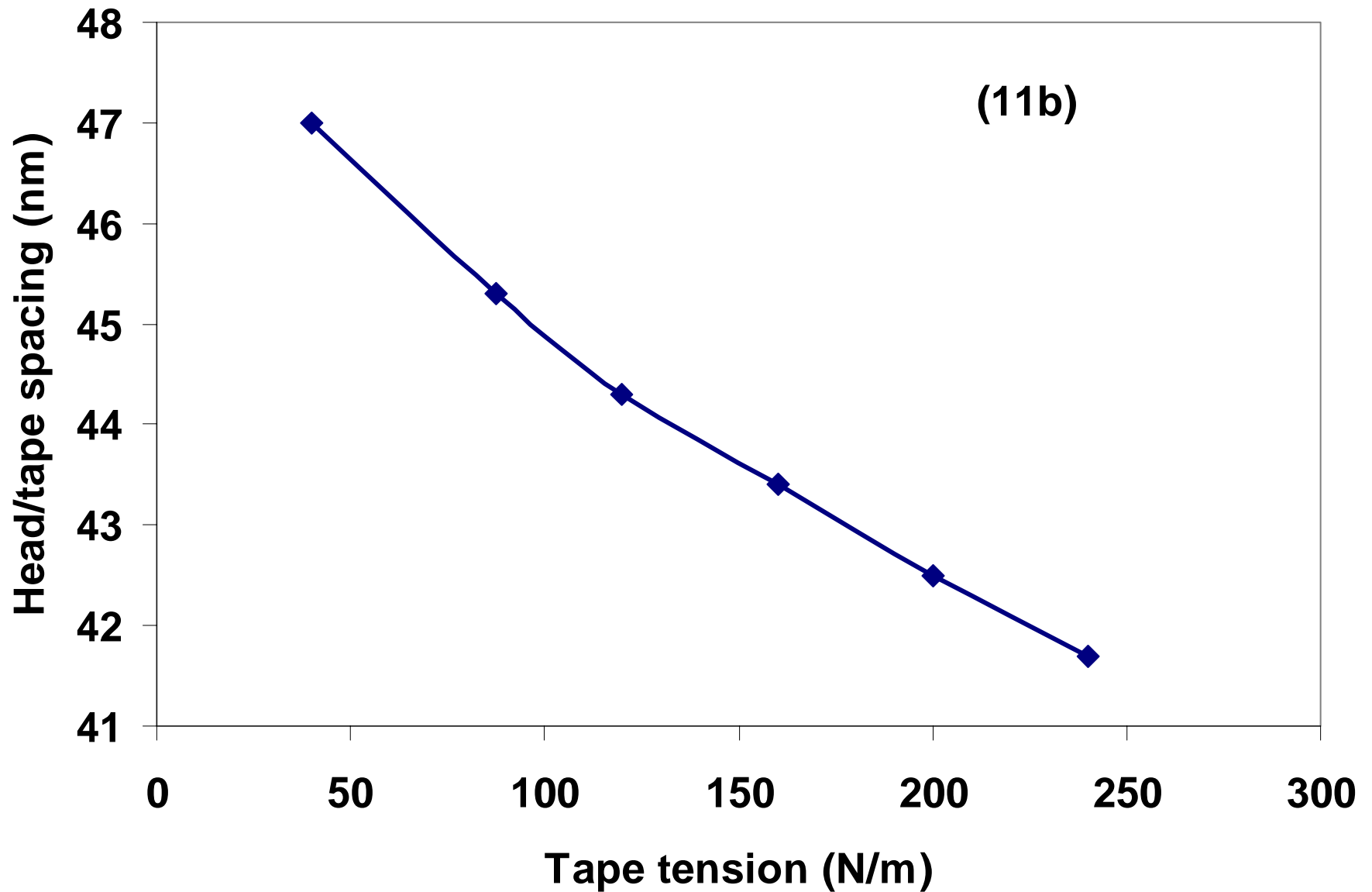


Performance comparison

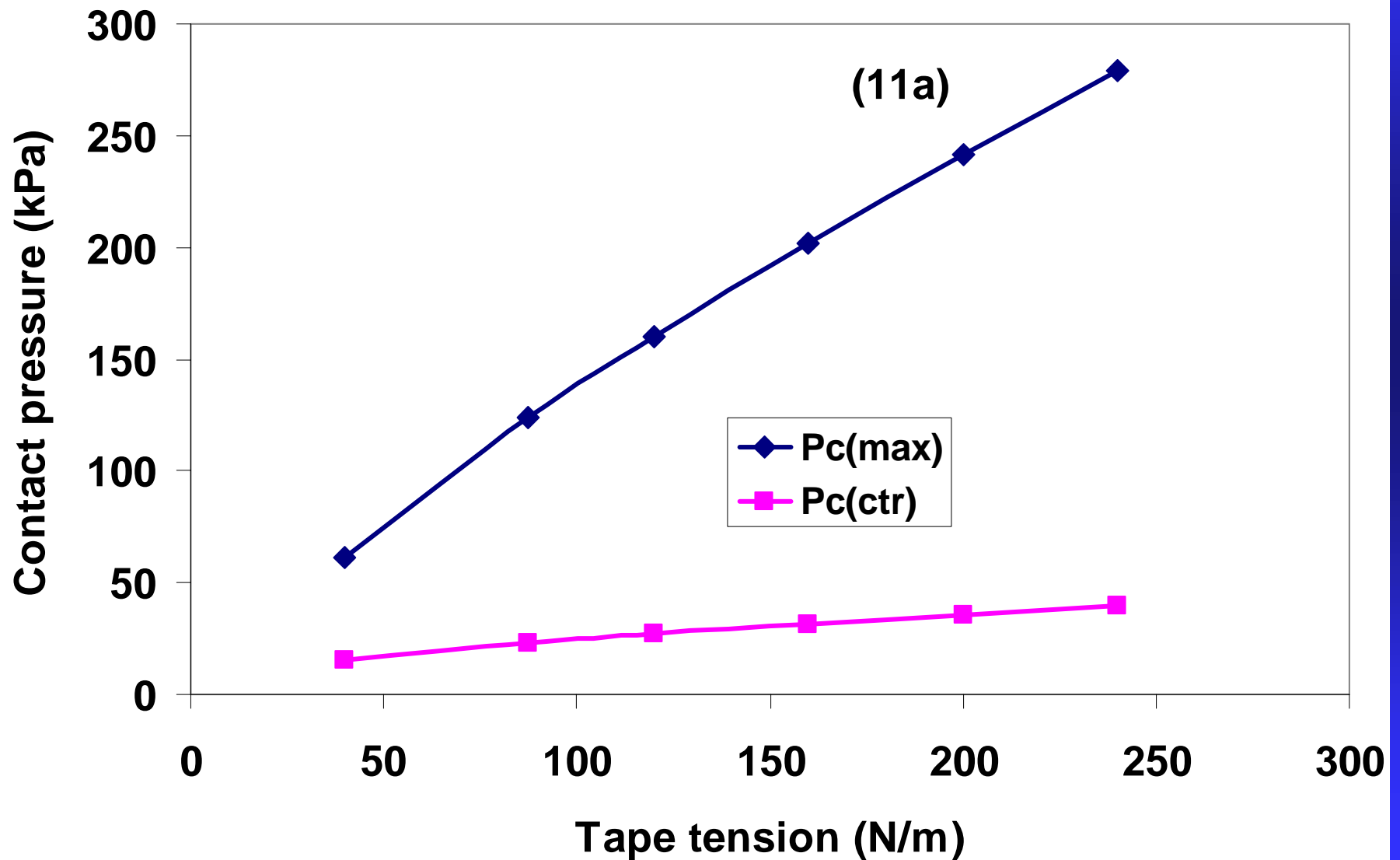
Head type	Spacing (nm) (Center region)	p_c (kPa) (Center region)	Max. p_c(kPa) (Head edges)
Single	45	23	135
Double	43	32	441
Triple	44	30	326

Effect of Head/Tape Interface Parameters

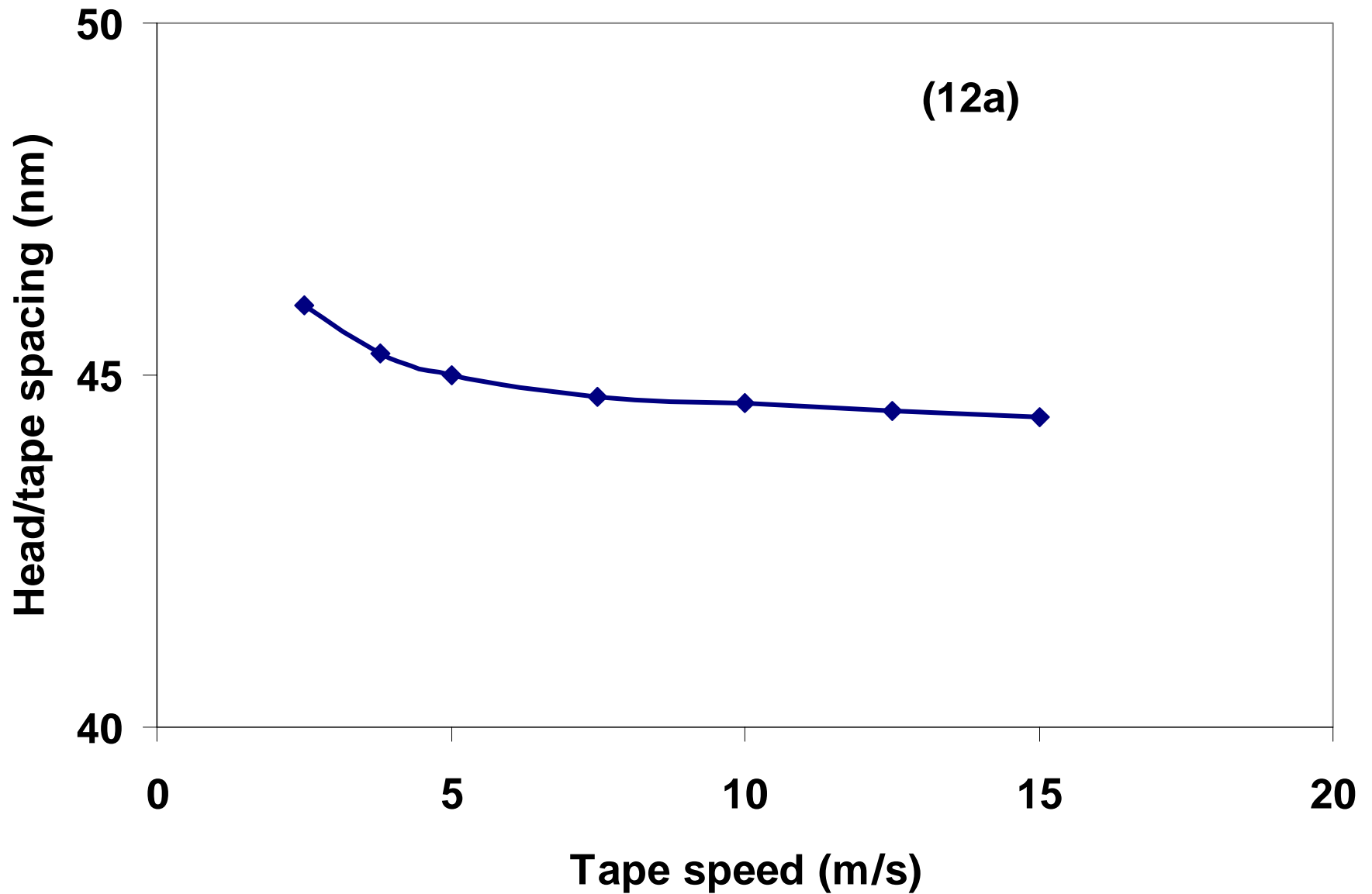
Effect of tape tension on uniform spacing



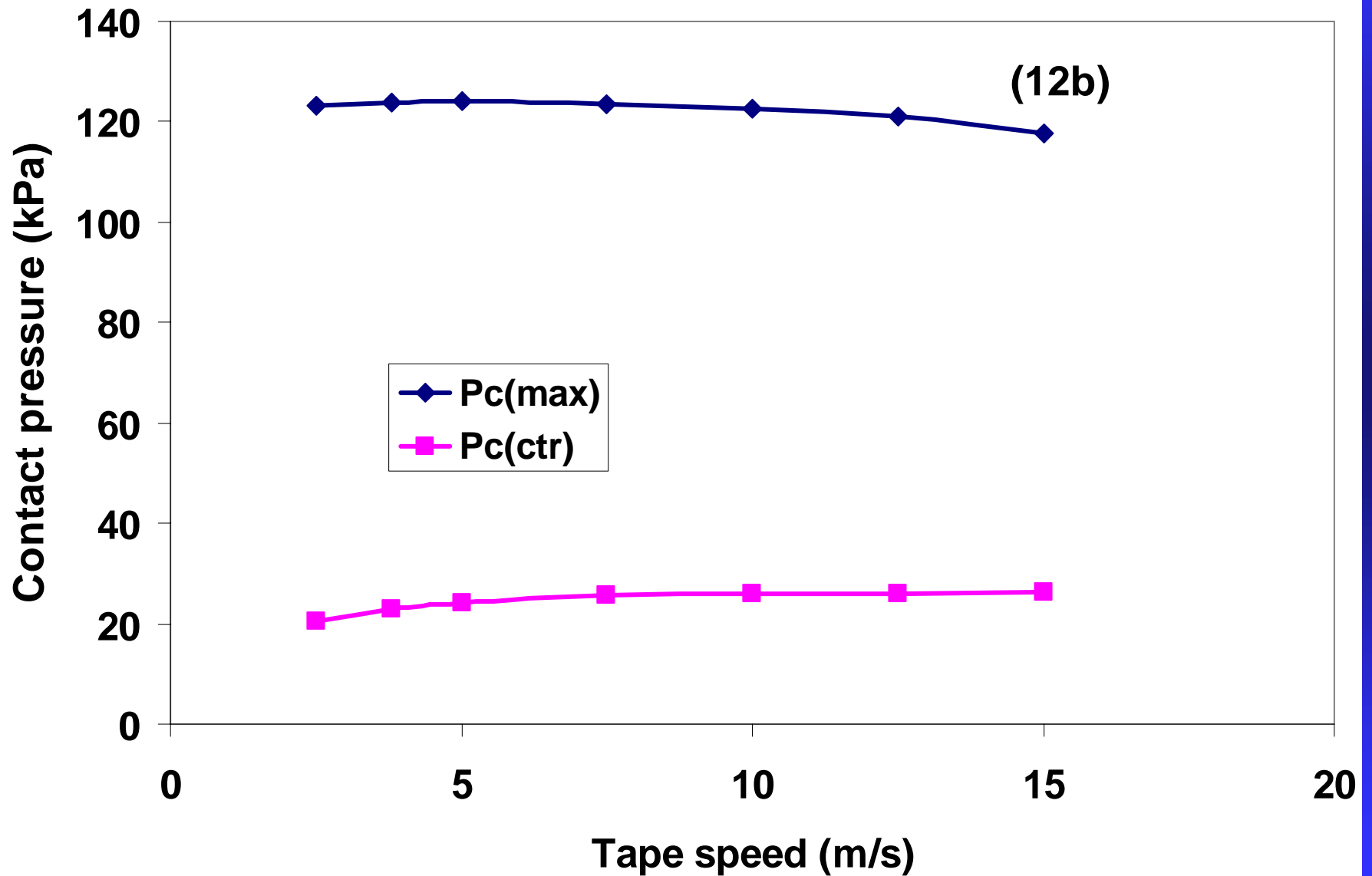
Effect of tape tension on $p_c(\text{max})$ and $p_c(\text{ctr})$



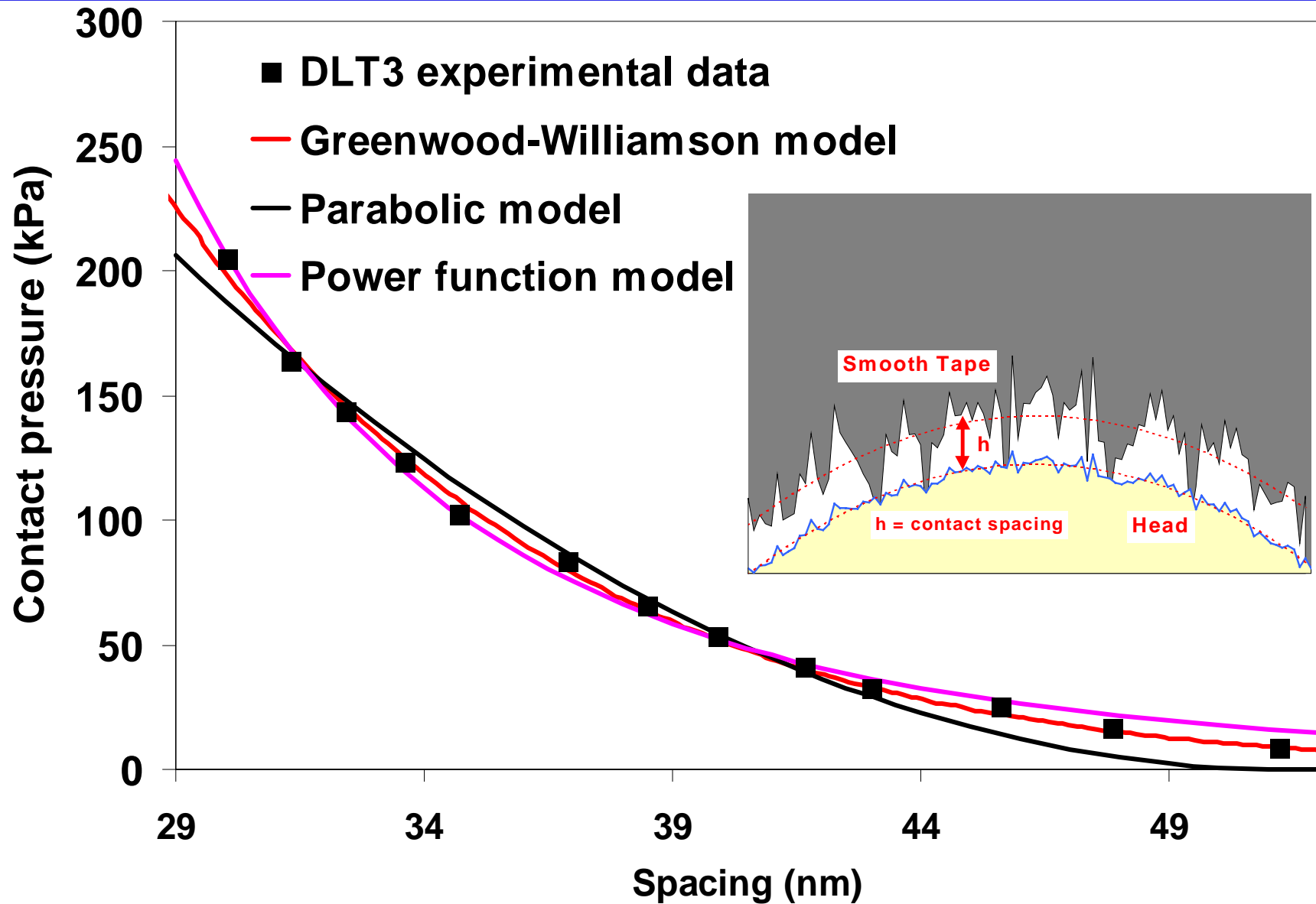
Effect of tape speed on uniform spacing



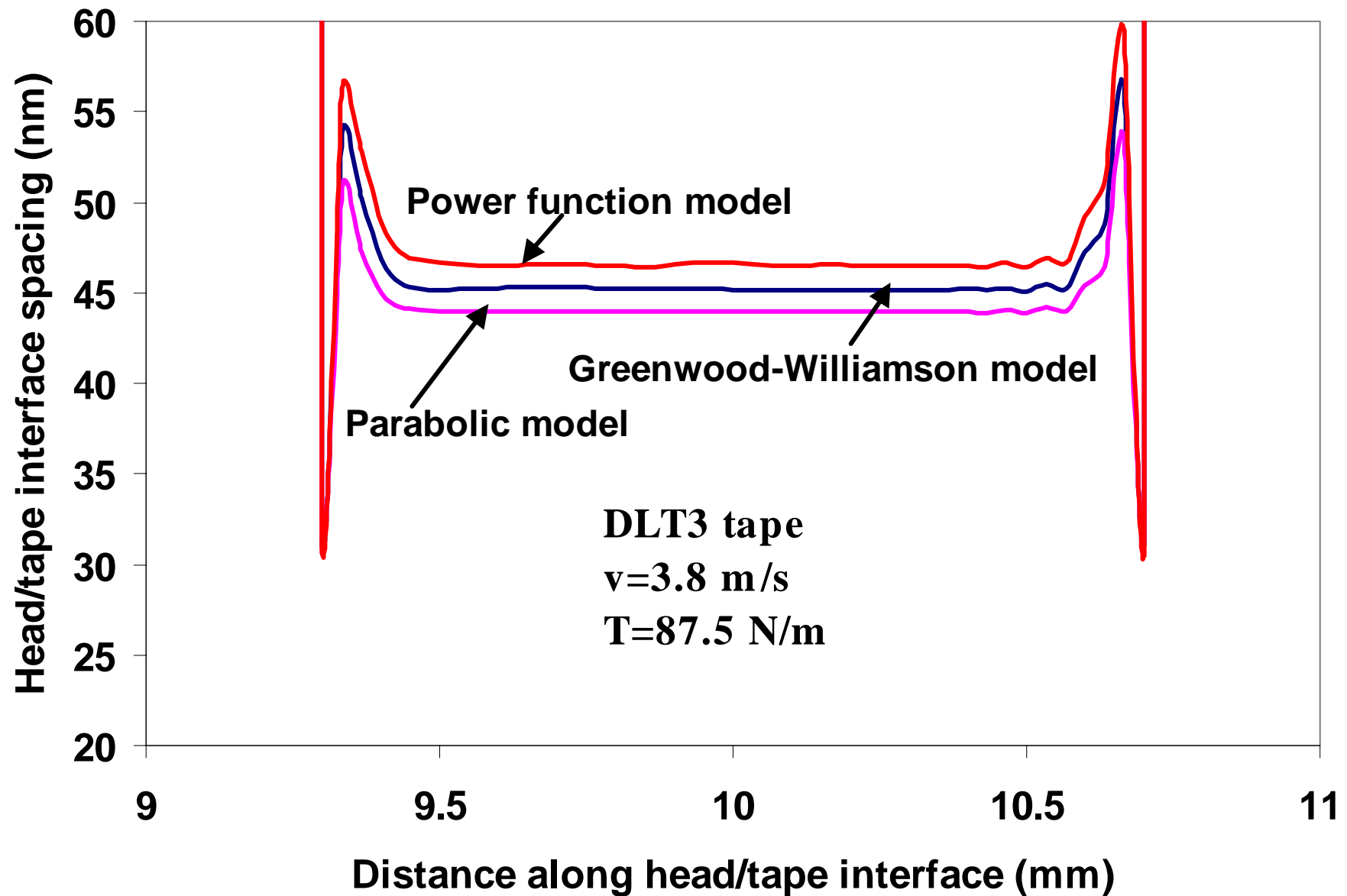
Effect of tape speed on $p_c(\text{max})$ and $p_c(\text{ctr})$



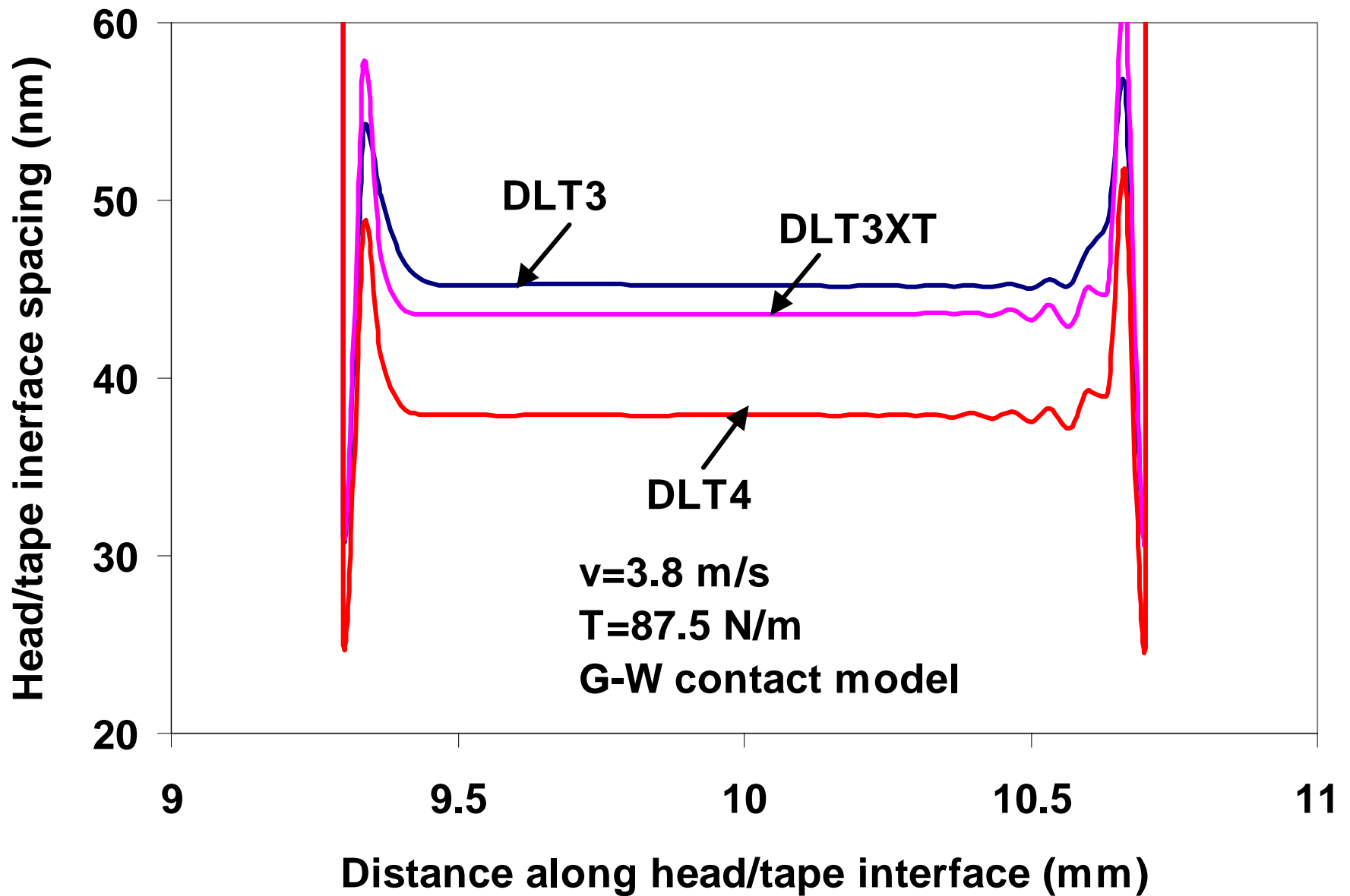
Three different contact models



Effect of contact models on spacing prediction



Effect of tape medium



Summary

- **Single, double and triple module heads were optimized**
- **Effect of head dimensional parameters on head/tape spacing and contact pressure was studied**
- **Effect of head/tape interface parameters was investigated**