LaTeX Research Paper Template

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Abstract

Write the abstract of your research here. Write the selling points of your research compactly.

Keywords: Keworkds

1 Introduction

1. Describe the problem you deal with.
2. Mention the history of the research area.
3. Briefly introduce your method(s) and result(s).
4. Write the other approaches to deal with the problem and compare them with your approach.
5. Summarize your research results.
6. DELIVER THE SELLING POINTS OF YOUR RESEARCH CLEARLY!

2 Main Body

Scientifically describe the methodology to solve the problem.

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2.1 Main Body Subsection 1

Let $\bar{\Omega}$ is the closure of $\Omega \subset \mathbb{R}^d$, we define the vector space $\mathcal{C}(\bar{\Omega})$ to consist of all those functions $\phi \in \mathcal{C}^m(\Omega)$ for which $D^\alpha \phi$ is bounded and uniformly continuous on Ω for $|\alpha| = \alpha_1 + \cdots + \alpha_d \leq m$. In the following, a function $\phi \in \mathcal{C}^m(\Omega)$ is said to be a $\mathcal{C}^m$- function. If Ψ is a function defined on Ω, we define the **support** of Ψ as

$$\mathrm{supp}\Psi = \overline{\{x \in \Omega | \Psi(x) \neq 0\}}.$$

A family $\{U_k : k \in \mathcal{D}\}$ of open subsets of $\mathbb{R}^d$ is said to be **a point finite open covering** of $\Omega \subseteq \mathbb{R}^d$ if there is an integer M such that any $x \in \Omega$ lies in at most M of the open sets U_k and $\Omega \subseteq \bigcup_k U_k$.

$$w(x) = \begin{cases} (1-x^2)^l, & |x| \leq 1, \\ 0, & |x| > 1, \end{cases}$$

where l is an integer. Then $w(x)$ is a $\mathcal{C}^{l-1}$-function. In $\mathbb{R}^d$, the weight function $w(x_1, \cdots, x_d)$ can be constructed from a one-dimensional weight function as $w(x_1, \cdots, x_d) = \prod_{i=1}^d w(x_i)$.

In this paper, we use the normalized window function defined by

$$w_\delta^l(x) \quad = \quad Aw(\frac{x}{\delta}),$$

where $A = [(2l+1)!]/[2^{2l+1}(l!)^2\delta]$ is the constant that makes $\int_{\mathbb{R}} w_\delta^l(x)dx = 1$.

2.2 Main Body Subsection 2

First, we define one-dimensional PU functions without flat-top, and then we modify the PU functions to have flat-top.

For any positive integer n, $\mathcal{C}^{n-1}$- piecewise polynomial basic PU functions are constructed as follows: For integer $n \geq 1$, we define a piecewise polynomial function by

$$\varphi_{g_n}^{(pp)}(x) = \begin{cases} \varphi_{g_n}^L(x) := (1+x)^n g_n(x) & \text{if} \quad x \in [-1, 0], \\ \varphi_{g_n}^R(x) := (1-x)^n g_n(-x) & \text{if} \quad x \in [0, 1], \\ 0 & \text{if} \quad |x| \geq 1, \end{cases}$$

where $g_n(x) = a_0^{(n)} + a_1^{(n)}(-x) + a_2^{(n)}(-x)^2 + \cdots + a_{n-1}^{(n)}(-x)^{n-1}$ whose coefficients are inductively constructed by the following recursion formula:

$$a_k^{(n)} = \begin{cases} 1 & \text{if} \quad k = 0, \\ \displaystyle\sum_{j=0}^{k} a_j^{(n-1)} & \text{if} \quad 0 < k \leq n-2, \\ 2(a_{n-2}^{(n)}) & \text{if} \quad k = n-1. \end{cases} \tag{1}$$

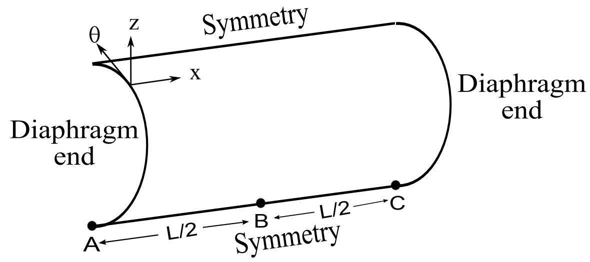

Figure 1: Deformation of a transverse normal according to Kirchoff (classical), Reissner-Mindlin (first order), and third order plate theories.

Using the recurrence relation (1), $g_n(x)$ is as follows:

$$\begin{aligned}
g_1(x) &= & 1 \\
g_2(x) &= & 1 - 2x \\
g_3(x) &= & 1 - 3x + 6x^2 \\
g_4(x) &= & 1 - 4x + 10x^2 - x^3 \\
g_5(x) &= & 1 - 5x + 15x^2 - 35x^3 + 70x^4 \\
&\vdots & \vdots
\end{aligned}$$

3 Numerical or Experimental Results

Demonstrate and illustrate how your method is effectively working in this section. You may compare the results obtained by your method and other results.

4 Conclusion

Summarize your research, including the result(s).

Table 1: Fundamental frequency $\bar{\omega}_{mn}$ for a CCCC square Reissner-Mindlin plate with $h/a = 0.1$, $k_s = 0.8601$, $\nu = 0.3$

Method	FEM	RKPM	RPPM	Rayleigh-Ritz
DOF	441	289	196	·
Mode no.(m, n)				
1(1,1)	1.5955	1.5582	1.5910	1.594
2(2,1)	3.0662	3.0182	3.0390	3.039
3(1,2)	3.0662	3.0182	3.0390	3.039
4(2,2)	4.2924	4.1711	4.2627	4.265
5(3,1)	5.1232	5.1218	5.0255	5.035
6(1,3)	5.1730	5.1594	5.0731	5.078
7(3,2)	6.1587	6.0178	6.0808	·
8(2,3)	6.1587	6.0178	6.0808	·
9(4,1)	7.6554	7.5169	7.4204	·
10(1,4)	7.6554	7.5169	7.4204	·
11(3,3)	7.7703	7.7288	7.6814	·
12(4,2)	8.4555	8.3985	8.2671	·
13(2,4)	8.5378	8.3985	8.3426	·