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Calculation of Natural Frequencies of Teeth Supported with the Periodontal Ligament

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Abstract:
Natural frequencies and vibration modes of four kinds of teeth were calculated by using a mechanical model. The alveolar bone and the tooth were assumed as rigid bodies, while the periodontal ligament was assumed as an elastic spring. All the natural frequencies were within a range of 1 to 10 kHz. The first natural frequencies of four teeth were about 1.5 kHz, and decreased as the root length decreased. Their vibration modes were tipping movements of the root. The natural frequency of the twisting vibration mode, or rotating movement around the tooth axis, was affected by root configuration. When subjected to a periodic force, the tooth and periodontal ligament would vibrate with the corresponding resonance mode. This phenomenon may be used as a method for the diagnosis and the treatment of a periodontal tissue.

Key words:
Natural frequency, Periodontal ligament, Numerical analysis

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