

Automatic Element Generations and Dynamic Analyses Applicable to Wide  
Varieties of Gears

黃國饒, Hsin Wei Su  
Mechanical Engineering  
Engineering  
kjhuang@chu.edu.tw

Abstract

This paper presents an approach to automatically generating high quality meshing elements applicable to wide varieties of gears by which extensive dynamic analysis to gearings using continuous models can be proceeded. Firstly, equations of a transverse section profile of a rack cutter are derived. Then, using the homogenous transformation matrix and equation of meshing for gears, equations of involutes, fillets, and other curves for gear teeth are deduced. Thus, geometric profiles of spur/helical gears or straight/spiral bevel ones are obtained. Next, not CAD models but using a C code, element models of the gears are generated after calculating nodal coordinates directly from the tooth profile equations. Creation of several element examples of the gears displays effectiveness of the proposed approach. Finally, dynamic responses of a standard spur pair and crowned helical gear pairs are investigated by the continuum method using the obtained element models.

Keyword : gear, element, dynamics, FEM, profile modification, transmission error.