基于接触角变量传递分析方法的
角接触球轴承动态特性求解

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摘要　 根据角接触球轴承高速运转时接触角的动态变化，
系统地分析了求解高速动态特性的方程组。从求解动态特性的辅助方程出发进行了变量传递关系分析，
发现各个方程组最终都是内外实际接触角的函数，
从而提出了一种基于接触角求解域搜索的角接触球轴承动态特性计算方法，
避免了传统的用Newton　Raphson方法迭代求解角接触球轴承动态特性过程的复杂性和迭代收敛问题，
将求解非线性方程组转变为验证方程组。本文还给出了寻找接触角最优值的最小二乘判别准则，
并通过算例说明了本算法的可行性。
关键词　 机械设计,角接触球轴承,动态特性,实际接触角, 变量传递分析, 最小二乘准则
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Solution of the dynamic characteristic of angular　contact ball bearing based on analysis of contact angle variable deliver

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Abstract Based on the dynamic change of the contact angle during the high　speed operation of the angular　contact ball bearing, a systematic analysis on the equation group of its dynamic characteristic was performed. The variable deliver was analyzed from the adjunct equations to solve the dynamic characteristic, and it was found that every adjunct equation is the function of the inner and outer actual contact angle. Therefore, a method based on the search in the contact angle solution domain was suggested to calculate the dynamic characteristic of the angular　contact ball bearing to avoid the complexity and the potential of iterative divergence of the conventional Newto　Raphson iterative method in solving the dynamic equation group, thus the method of solving the equation group is changed into the method of proving the equation group. Besides, a least　square criterion to identify the optimum contact angle was given. An example was presented to demonstrate the feasibility of the suggested method.

Key words　 mechanical design　 angular　 contact ball bearing　 dynamic characteristic　 actual contact angle　 analysis of variable deliver　 least　 squares criterion

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