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# 主要参数对面齿轮传动噪声辐射的影响分析
## Influence predictions of base parameters on noise radiations of face gear drives

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**中文摘要**:

　　为研究面齿轮传动力学特性及噪声辐射,通过建立面齿轮传动的弯扭耦合动力学模型,在分析轴承支承处动载荷的基础上,结合有限元法和边界元法,形成了面齿轮传动的噪声辐射计算流程.此外,利用该计算流程,开展了算例分析,讨论了单一几何参数和工况对面齿轮传动噪声辐射的影响规律.仿真结果表明:模数和传动比对改善面齿轮传动噪声辐射有益,压力角对其噪声辐射影响不明显.研究结果为低噪声面齿轮传动的设计奠定了必要的理论基础.

**英文摘要**:

　　To investigate the dynamic behaviors and noise radiations of face gear drives, a calculation procession of noise radiations of face gear drives, which is based on lumped mass method, finite element method (FEM) and boundary element method (BEM), was proposed. Furthermore, a noise radiation of an example case was simulated, and the influences of base geometric parameters and operating conditions on noise radiations of face gear drives were discussed. The analytic results indicate increasing module and drive ratios would benefit to reduce noise radiations, and pressure angles would be insensitive for noise radiations, et al. These contributions would be helpful to improve the design of face gear drives associated with low noise radiations.

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**参考文献(共18条):**

[1] Litvin L F,Zhang Y,Wang J C,et al.Design and geometry of face-gear drives[J].Journal of Mechanical Design,1992,114(4):642-647.

[2] Litvin L F,Fuentes A,Howkins M.Design,generation and TCA of new type of asymmetric face-gear drive with modified geometry[J].Computer Methods in Applied Mechanics and Engineering,2001,190(43):5837-5865.

[3] Litvin L F,Fuentes A,Zanzi C,et al.Design,generation,and stress analysis of two versions of geometry of face-gear drives[J].Mechanism and Machine Theory,2002,37(10):1179-1211.

[4] Litvin L F,Gonzalez-Perez I,Fuentes A,et al.Design,generation and stress analysis of face-gear drive with helical pinion[J].Computer Methods in Applied Mechanics and Engineering,2005,194(36):3870-3901.

[5] LI Zhengminqing,LIU Xinsheng,ZHU Rupeng.Comparison of dynamic behaviors and strength among three versions of face gear drives with high contact ratios[J].Journal of Vibroengineering,2015,17(1):125-136.

[6] LI Zhengminqing,WU Hao,ZHU Rupeng.Influence predictions of geometric parameters on face gear strength[J].Advanced in Mechanical Engineering,2015,2(1):1-7.

[7] Litvin L F,Wang J C,Bossler R B,Jr,et al.Application of face-gear drives in helicopter transmissions[J].Journal of Mechanical Design,1994,116(3):672-676.

[8] Litvin L F,Egelja A,Tan J,et al.Handbook on face gear drives with a spur involute pinion[R].NASA CR-209909,2000.

[9] 李晓贞,朱如鹏,李政民卿,等.齿面摩擦对面齿轮传动系统振动特性的影响分析[J].振动工程学报,2014,27(4):584-588. LI Xiaozhen,ZHU Rupeng,LI Zhengminqing,et al.Influences of frictional coeffiencet on vibration characteristic of face gear transmission system[J].Journal of Vibration Engineering,2014,27(4):584-588.(in Chinese)

[10] 靳广虎,朱如鹏,鲍和云.正交面齿轮传动系统的非线性振动特性[J].中南大学学报:自然科学版,2010,41(5):1807-1813. JIN Guanghu,ZHU Rupeng,BAO Heyun.Nonlinear dynamical characteristics of face gear transmission system[J].Journal of Central South University:Science and Technology,2010,41(5):1807-1813.(in Chinese)

[11] 杨振,王三民,范叶森,等.面齿轮传动系统参数激励振动特性分析[J].重庆大学学报,2011,34(1):26-35. YANG Zhen,WANG Sanmin,FAN Yesen,et al.Vibration characteristics of face-gear transmission system with parametric excitation[J].Journal of Chongqing University,2011,34(1):26-35.(in Chinese)

[12] 杨振,王三民,范叶森,等.正交面齿轮传动系统分岔特性[J].哈尔滨工业大学学报,2011,43(3):107-110. YANG Zhen,WANG Sanmin,FAN Yesen,et al.Bifurcation characteristics of face-gear transmission system[J].Journal of Harbin Institute of Technology,2011,43(3):107-110.(in Chinese)

[13] HU Zehua,TANG Jinyuan,CHEN Siyu,et al.Effect of mesh stiffness on the dynamic response of face gear transmission system[J].Journal of Mechanical Design,2013,135(7):1-7.

[14] 张乐,朱如鹏,李政民卿.面齿轮传动分扭系统扭转振动的固有频率分析[J].机械制造与自动化,2012,41(5):21-24. ZHANG Le,ZHU Rupeng,LI Zhengminqing,Research on natural frequency of torsional vibration of torque-split face gear transmission system[J].Machine Building & Automation,2012,41(5),21-24.(in Chinese)

[15] 赵宁,王锐锋,贾清健.面齿轮分扭传动系统均载研究[J].机械传动,2013,37(12):5-8. ZHAO Ning,WANG Ruifeng,JIA Qingjian.Study on the load sharing of face gear split torque transmission system[J].Journal of Mechanical Transmission,2013,37(12):5-8.(in Chinese)

[16] 陈广艳,陈国定,李永祥,等.含有面齿轮的传动系统动态响应特性研究[J].航空动力学报,2009,24(10):2391-2396. CHEN Guangyan,CHEN Guoding,LI Yongxiang,et al.Dynamic response analysis of gear drive with face-gears[J].Journal of Aerospace Power,2009,24(10):2391-2396.(in Chinese)

[17] Moyne S L,Tébec J L.Ribs effects in acoustic radiation of a gearbox:their modelling in a boundary element method[J].Applied Acoustics,2002,63(2):223-233.

[18] Tanaka E,Houjou H,Muton D,et al.Sound radiation analysis system and design of a low noise gearbox with a multi-stage helical gear system[J].Transactions of the Japan Society of Mechanical Engineers,2003,69(4):272-279.

**相似文献(共20条):**

[1] 邵忍平,沈允文,孙进才.齿轮传动加速度噪声辐射机理研究[J].机械强度,2000,22(4):310-311,314.

[2] 笹倉実,彭惠民.平行万向联轴节式齿轮传动装置的振动辐射噪声分析[J].国外铁道车辆,2015,52(4).

[3] 李全柱,马占才,郭春宁,王俊峰.齿轮传动噪声分析与控制实例[J].建筑机械,2002(8):47-48.

[4] 李俊华.工程机械齿轮传动噪声的产生及其控制[J].科学技术与工程,2006,6(18):2887-2889.

[5] 黄其柏 师汉民.齿轮啮合噪声辐射特性研究[J].农业机械学报,1993,24(4):80-85.

[6] 孟百刚,武北威.改善齿轮噪声的途径[J].一重技术,2002(2):23-24.

[7] 柏春霞,李柄成.压力机齿轮传动及噪声成因分析[J].锻压机械,2012(5):20-22.

[8] 肖利民 唐进元.低噪声齿轮设计方法（一）[J].制造技术与机床,1995(5):30-33.

[9] 胡涛.摩托车发动机齿轮传动噪声分析与控制[J].摩托车技术,2005(9):20-22.

[10]徐磊,陈兵奎,吴长鸿,王振荣.齿轮传动振动噪声试验系统研制[J].机械传动,2011,35(4).

[11]夏卿坤,胡冠昱,吴宪平,彭卉.齿轮传动噪声的控制[J].机械设计与制造,2005(3):85-86.

[12]邵忍平,郭万林,李宗斌.齿轮传动振动噪声计算的Kato方法[J].机械,2002,29(3):12-14.

[13]靳栩彬,李鹏德,李彬.降低压力机齿轮传动噪声的几种有效方法[J].锻压装备与制造技术,2010,45(4):39-40.

[14]邵忍平,孙进才,沈允文,赵宁.齿轮结构振动幅射噪声机理研究[J].机械传动,2001,25(1):20-23.

[15]刘志国,裴宏昌.用误差补偿技术降低齿轮传动噪声问题的探讨[J].河北理工学院学报,1990(3).

[16]刘小琴.齿轮传动噪声的控制措施研究[J].山西师范大学学报,2010,24(2):59-61.

[17]徐爱军,邓效忠,张静,李聚波,聂少武.准双曲面齿轮振动噪声试验与预估分析研究[J].机械设计,2012,29(12):17-21.

[18]池海宁.齿轮传动噪声的控制措施[J].机械研究与应用,2006,19(2):39-39,45.

[19]周晓伟.常用齿轮噪音问题的分析[J].安徽工业大学学报,2010,27(Z1).

[20]夏罗生,朱树红.数控机床齿轮传动系统的噪声分析[J].机械研究与应用,2006,19(2):36-37.

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