

## 新疆岩蜥三元耦合耐冲蚀磨损特性及其仿生试验

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收稿日期 2007-7-9 修回日期 2007-8-9 网络版发布日期 2008-4-22 接受日期 2007-8-9

### 摘要

选取新疆岩蜥为典型动物,以形态、结构、材料作为因素设计仿生耦合试样,通过喷砂试验检验耦合试样表面的冲蚀磨损特性。喷砂试验选用粒径为1000  $\mu\text{m}$  的 $\text{Al}_2\text{O}_3$ 颗粒为磨料,对LY12硬铝合金与45#钢为基底的仿生耦合试样进行试验。结果表明,在冲蚀时间为180 s,入射角为 $30^\circ$ ,入射距离为200 mm,空气压力为0.4 MPa条件下,耦合试样耐冲蚀磨损性能较对照试样提高18.7%。耦合试样特征因子最优组合为以LY12硬铝合金为基底材料,非光滑单元形态的形状为圆形凹坑、直径为3 mm,单元间距为6 mm的规则分布,表面涂层( $\text{Al}_2\text{O}_3+13\%\text{TiO}_2$ )厚度为100  $\mu\text{m}$ 。

关键词 [仿生学](#) [仿生耦合](#) [新疆岩蜥](#) [冲蚀磨损](#) [正交试验设计](#)

分类号 [TB17](#)

## Erosive wear resistance of *Laudakin stoliczkana's* ternary coupling and bionic experiments

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**Abstract** Taking *Laudakin stoliczkana* as the reference animal, ternary bionic coupling samples were designed according to the orthogonal design of experiment involving the morphology, the surface structure, and the material as test factors. The samples were made on the substrate of the hard aluminum alloy LY12 or the steel 45# with wear resistant coating. The erosive wear resistances of the samples were investigated by the sand blast test using the  $\text{Al}_2\text{O}_3$  sand with partical size of 1000  $\mu\text{m}$  as the erodent. The results indicated that the erosive wear resistance of the coupling sample with pitting structure is 18.7% higher than that of the sample without pits under the following test conditions: erosive time duration 180 s, sand impact angle  $30^\circ$ , impact distance 200 mm, blast air pressure 0.4 MPa. The optimal combination of the coupling sample characteristic factors are:hard aluminium alloy LY12 as the substrate, the morphology of the non smooth units is the regularly distributed rotundity pit with diameter 3 mm and spacing 6 mm, the coating is  $\text{AL}_2\text{O}_3+13\%\text{TiO}_2$  with thickness of 100  $\mu\text{m}$ .

**Key words** [bionics](#) [bionic coupling](#) [Laudakin stoliczkana](#) [erosive wear](#) [orthogonal design of experiment](#)

DOI:

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