

Normal Maps and Parallax Mapping



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Original coding by Michael Tichenor

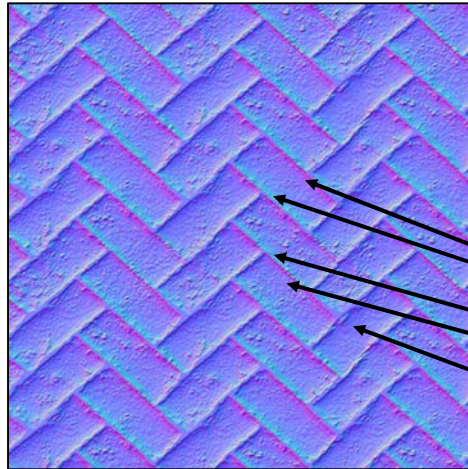


Texture-mapping starts with an interesting image



Let's say that we want to do bump-mapped displacements with these bricks. For certain types of textures, like this one, you could write a program to examine the texture texel-by-texel and come up with an approximate normal vector at each texel and then encode this into another texture image. This is called a **normal map**.

Getting the normals by analyzing the texture – the Normal Map



Red : nx
Green : ny
Blue : nz

Much red: $nx \sim +1$.
No red: $nx \sim -1$.

Much green: $ny \sim -1$.
No green: $ny \sim +1$.

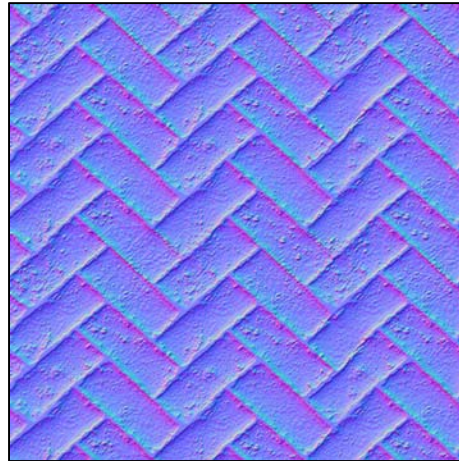
Much blue: $nz \sim +1$.



Interpreting this image is a little tricky. Normal vector components run from -1. to +1. But, color channels run from 0. to 1. So, a color value of 0. is needed to correspond to a normal component of -1., and a color value of 1. is needed to correspond to a normal component of +1. In this case, green is encoded upside-down.

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Original Texture Map and Normal Texture Map



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We can use the color texture image on top of a surface

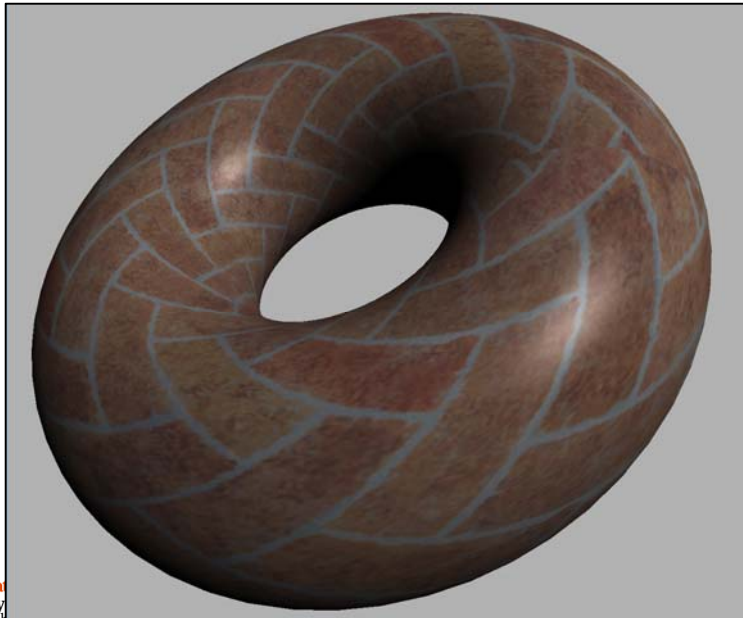
5



↑
Geometry you are displaying

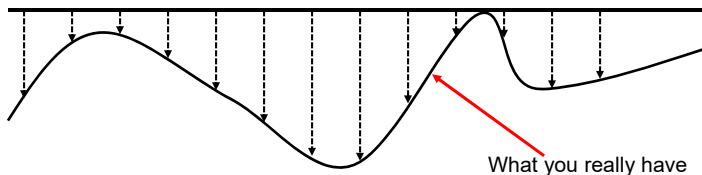
And then you get something like this

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But, what if the surface really has displacements, but you would only see them if you were using more geometric detail?

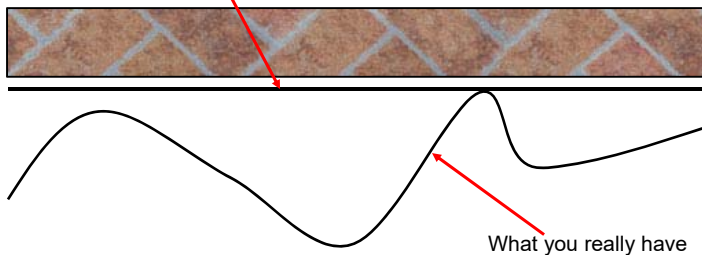
Geometry you are displaying



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Even turning on texture-mapping only puts the flat texture on the flat surface

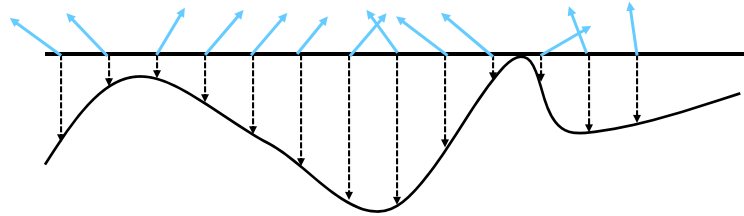
Geometry you are displaying



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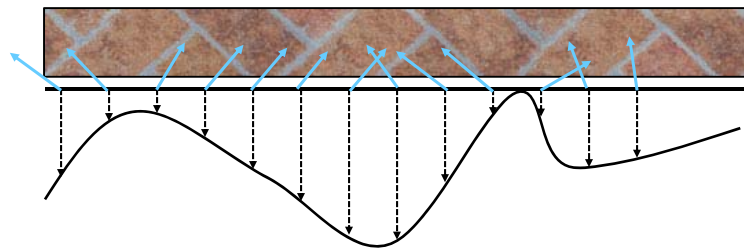
We could get the normals from the normal map and perform bump-mapping

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That is good, but . . .

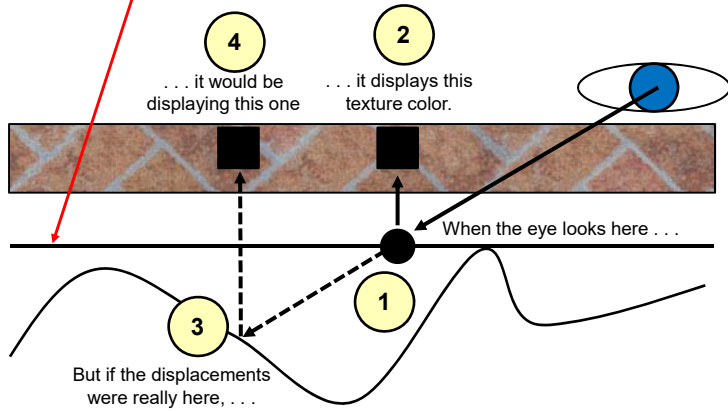
10



... we can do even better – Parallax Mapping

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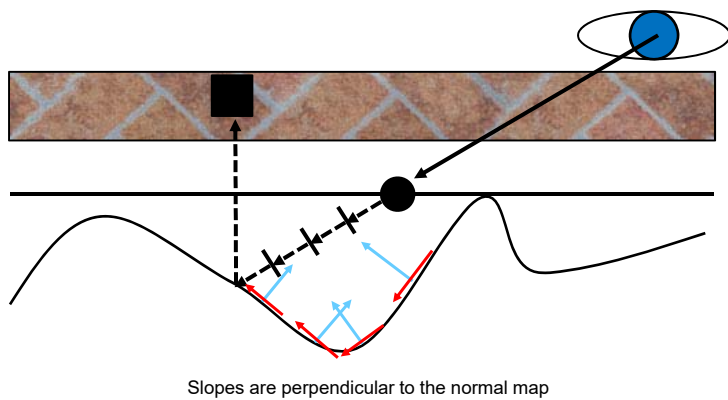
Geometry you are displaying



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The inner-loop of Parallax Mapping

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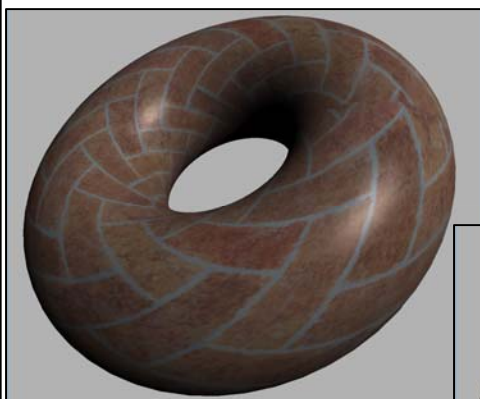
Parallax Mapping

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