Revit 插件: Dynamo 应用范例详解

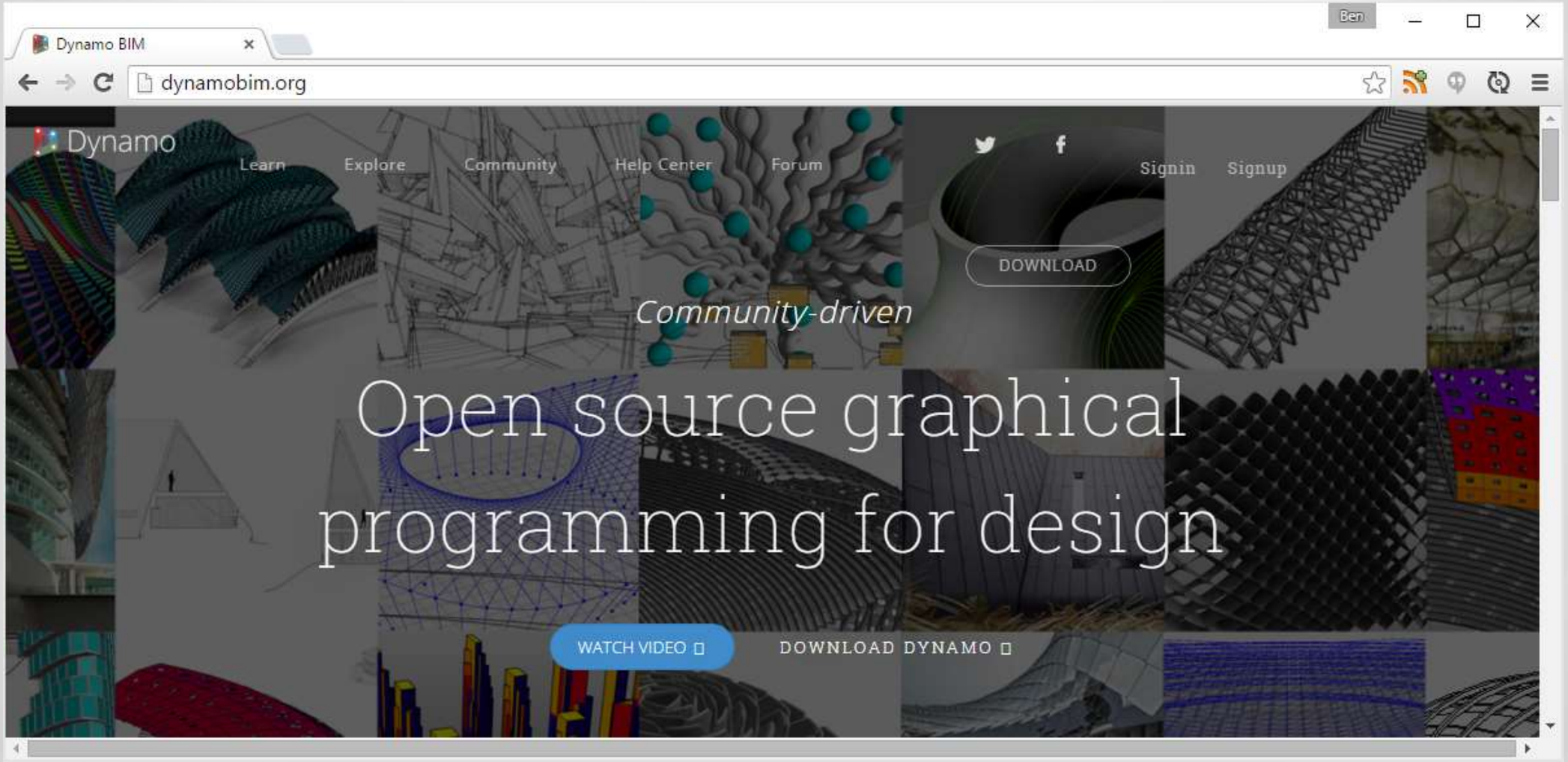
Ben Goh
首席工程师

Dynamo 工作室流程

- Dynamo 简介
  - Dynamo 基本操作
  - 几何概念，参数和向量
- 结构框架
  - 处理列表
  - 自定义节点
  - 参考和放置 Revit 元素
- 自适应构件
  - 放置自适应构件
  - 列表映射
- 处理表格式数据
  - 从 Excel 读取数据
  - 高级数据管理技巧和工具
  - Code Block 与范围表达式
- 实例：讲堂座位放置

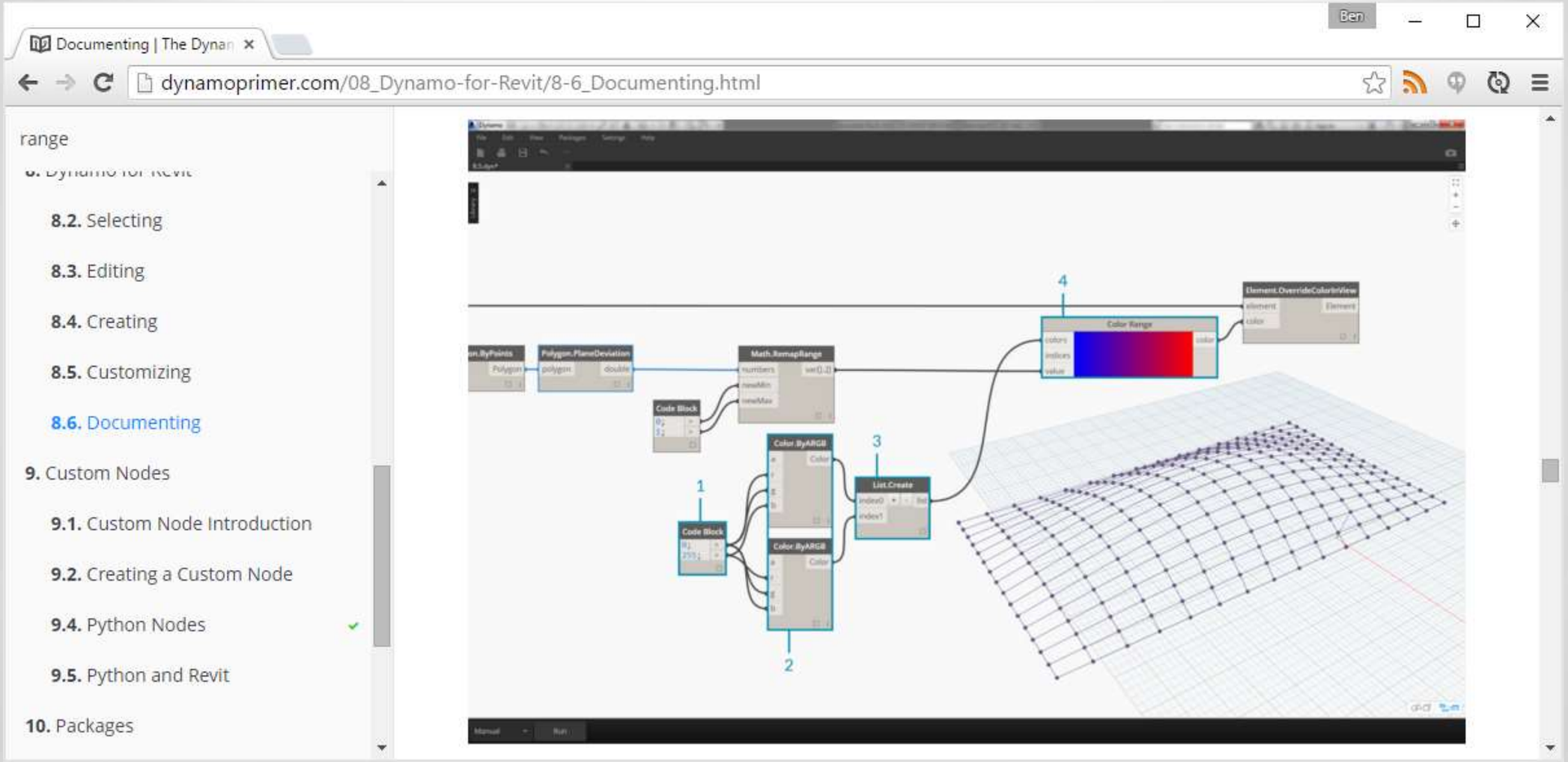
Dynamo 官方网站

- www.dynamobim.org



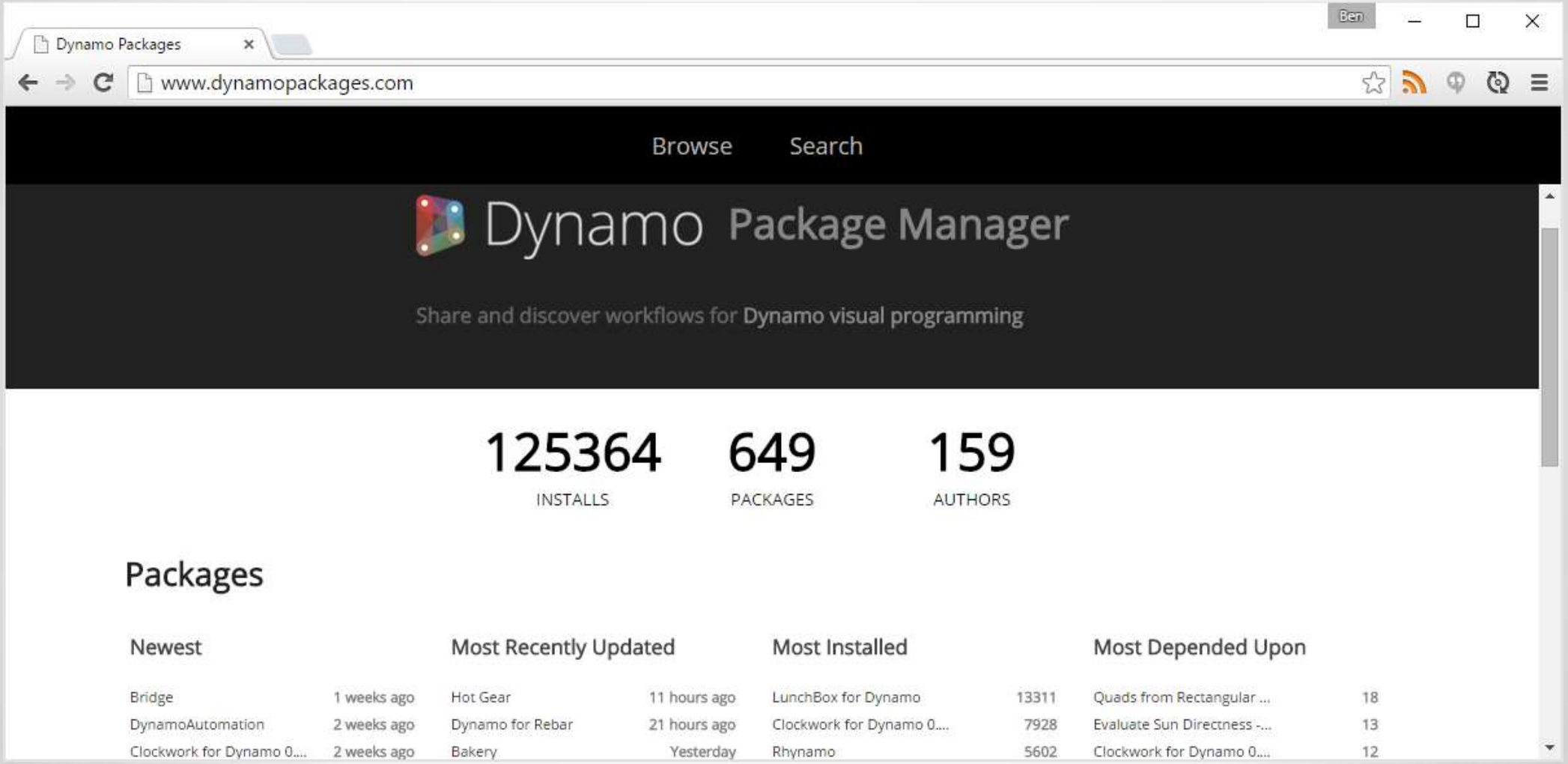
学习资料 Dynamo Primer

- www.dynamoprimer.com



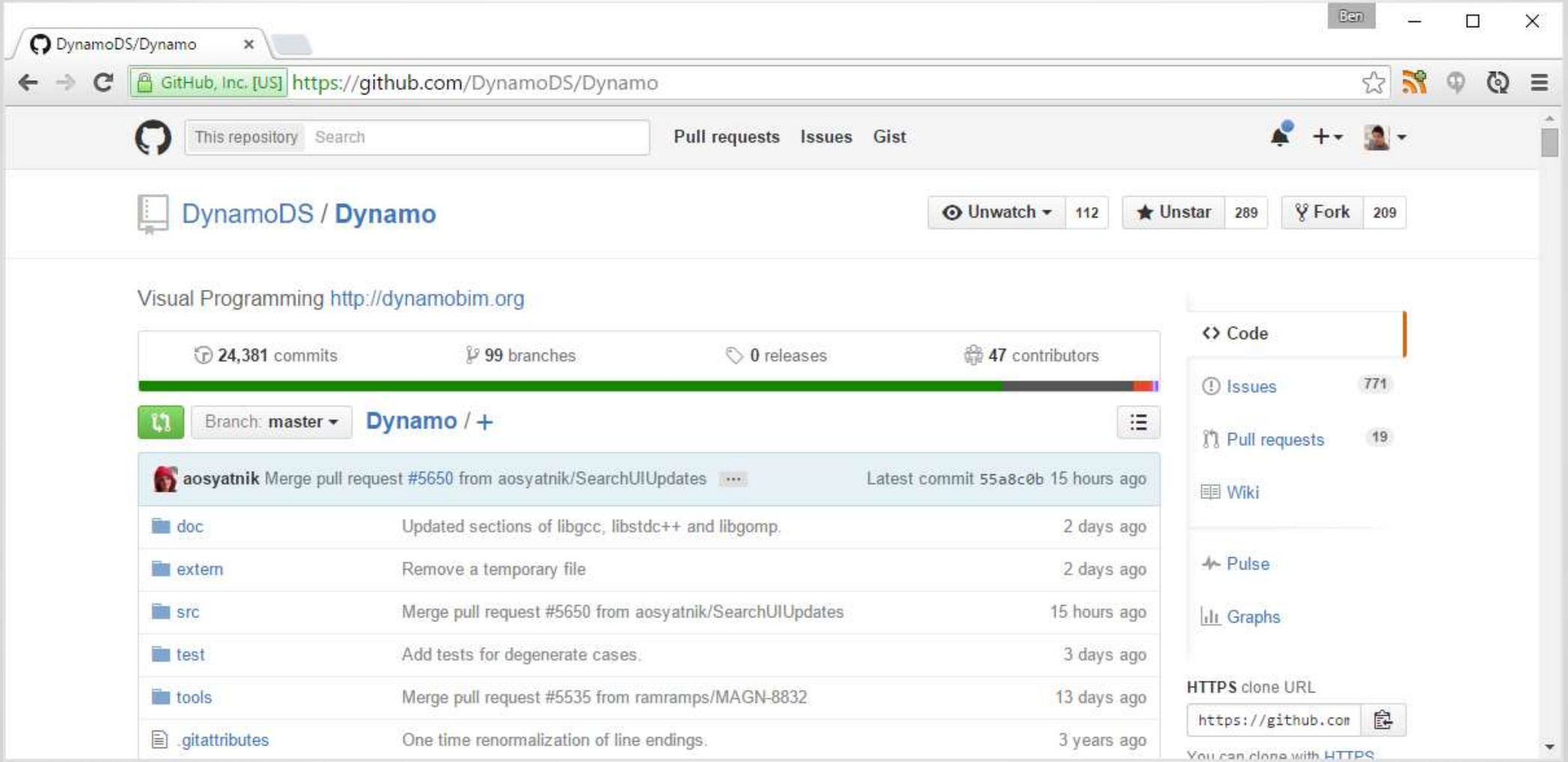
Dynamo 软件包

- www.dynamopackages.com



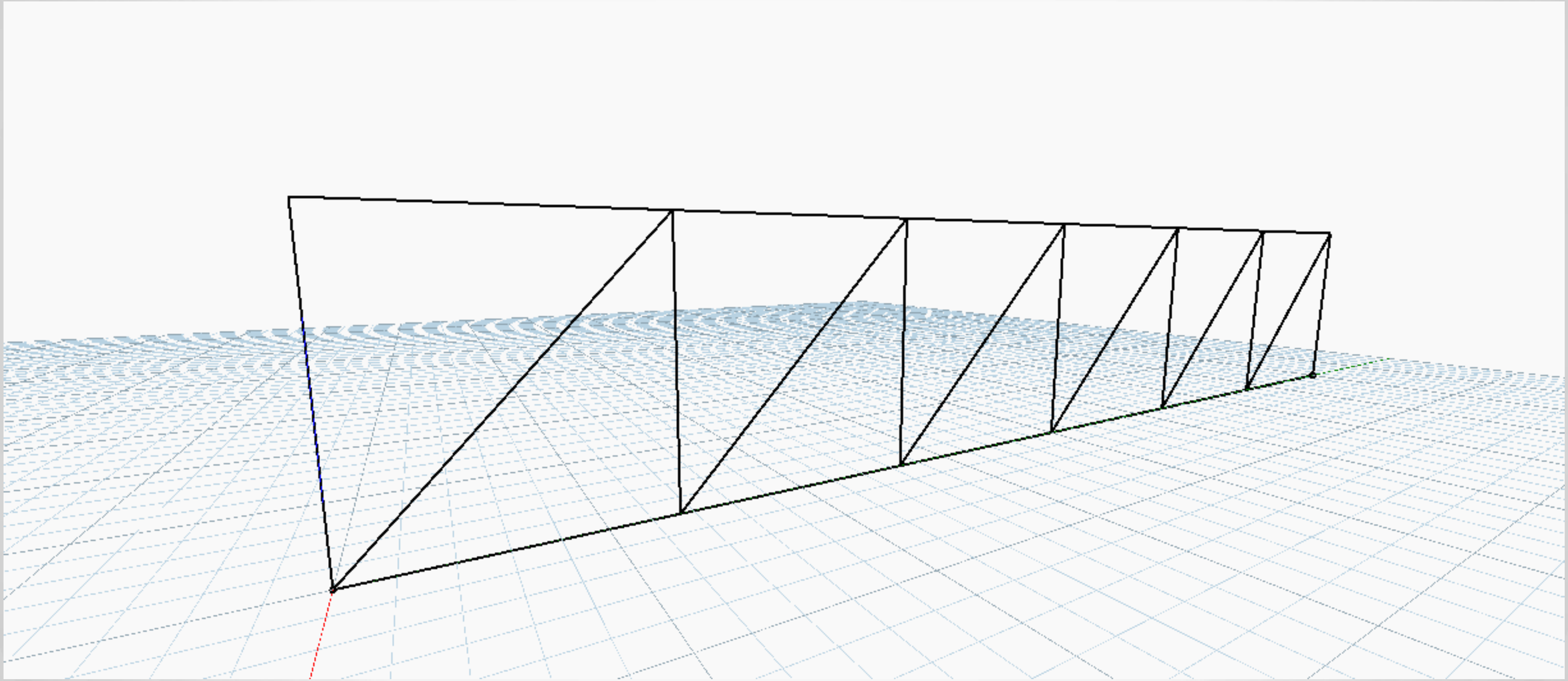
Dynamo 开源项目

- www.github.com/DynamoDS/Dynamo



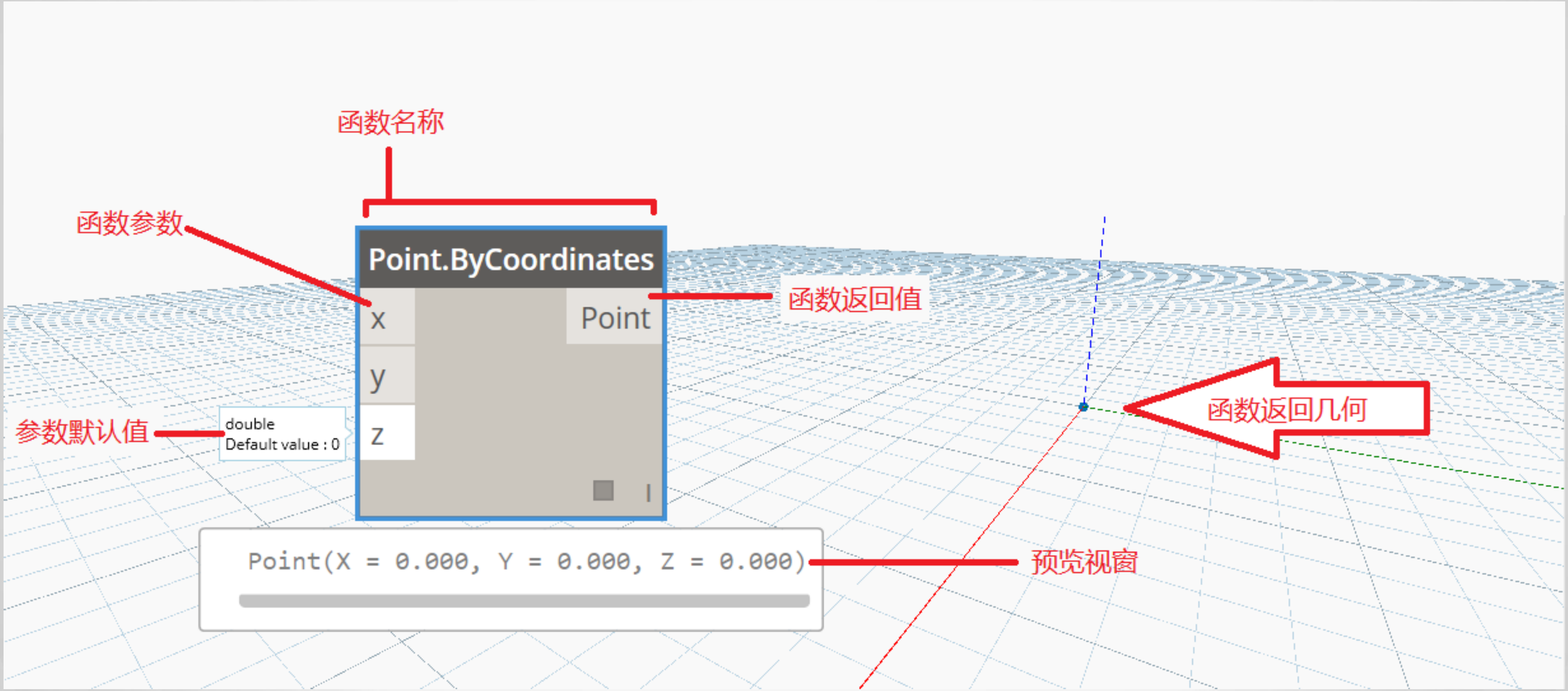
案例一：创建桁架结构

- Dynamo 基本操作，桁架结构的建造过程



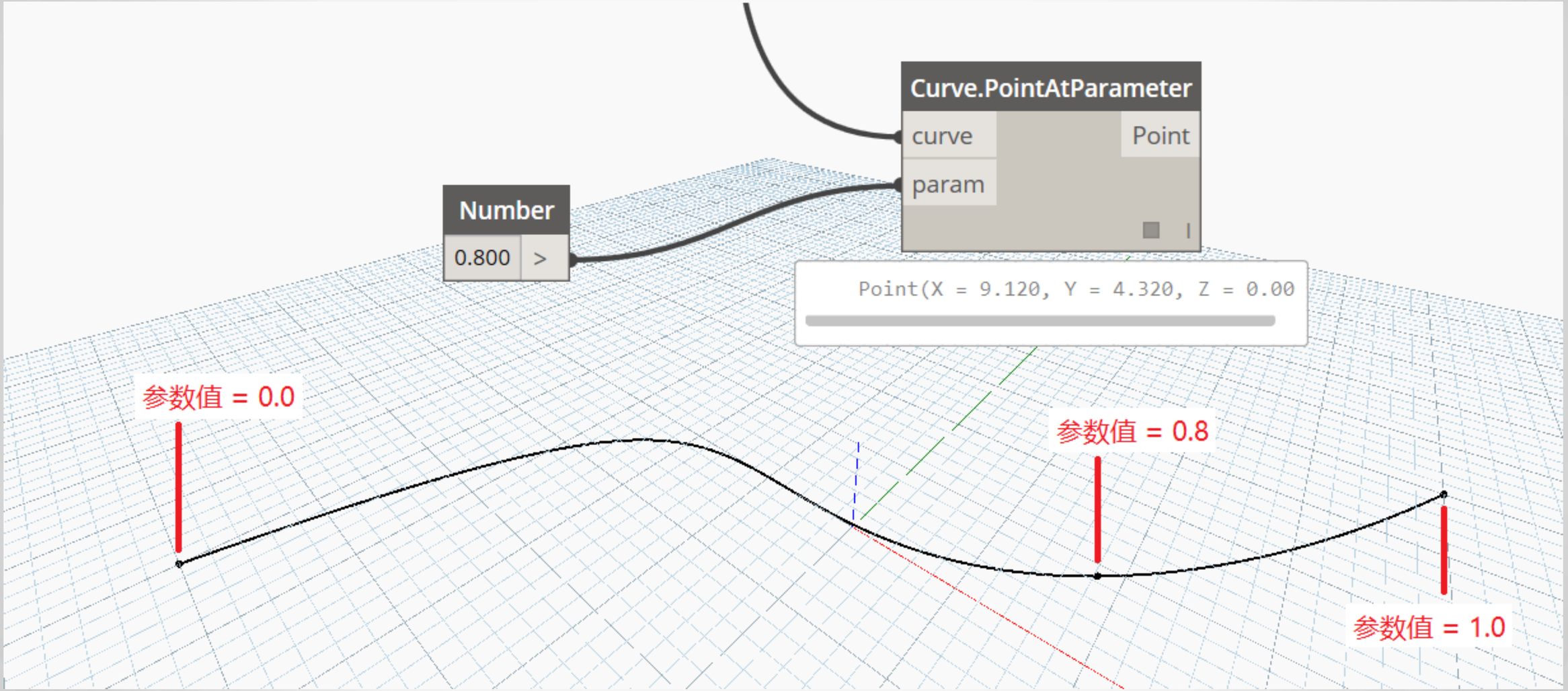
节点与函数对比

- 节点参数，默认值，返回值，几何图形



曲线参数值

- 参数值范围 [0.0, 1.0]

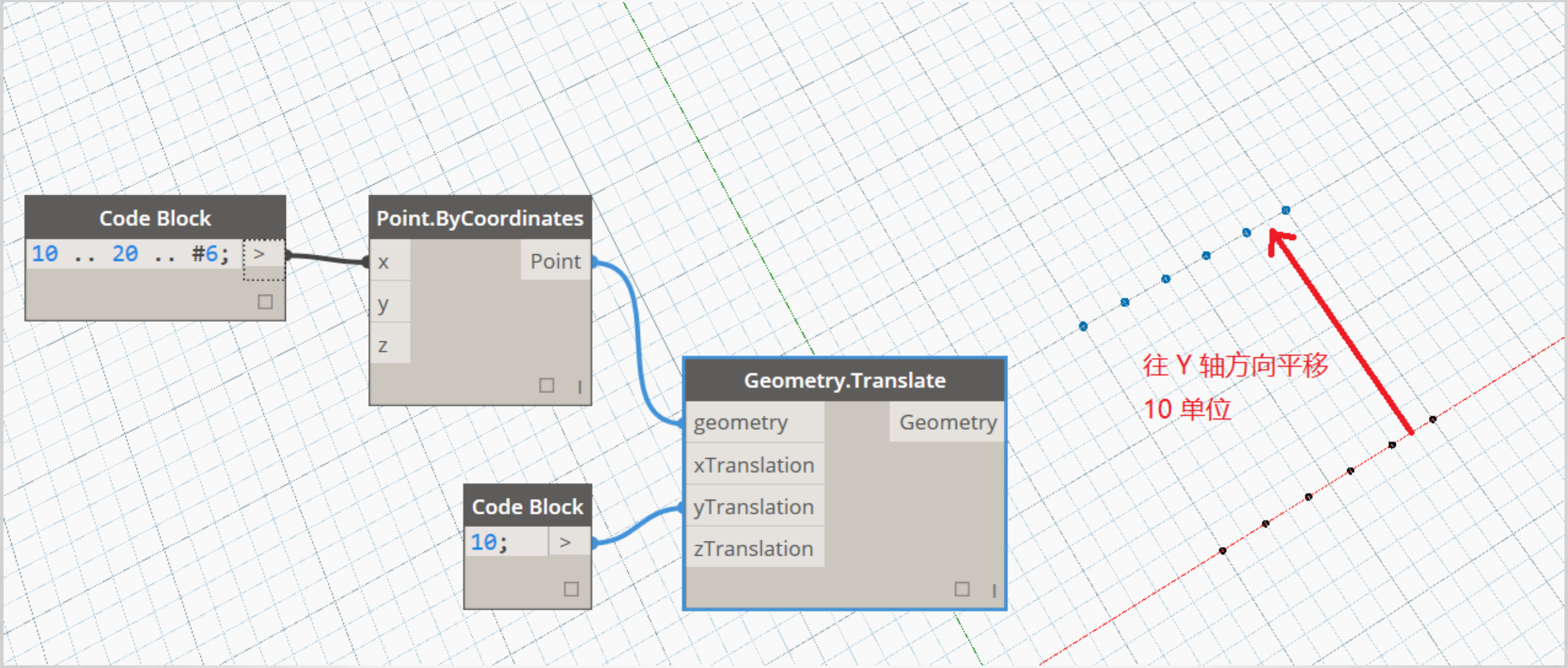


范围表达式

- 表达式一：起始值 .. 最终值
  - 10 .. 15 = { 10, 11, 12, 13, 14, 15 }
- 表达式二：起始值 .. 最终值 .. 距离
  - 10 .. 20 .. 2 = { 10, 12, 14, 16, 18, 20 }
  - 10 .. 20 .. 3 = { 10, 13, 16, 19 }
- 表达式三：起始值 .. 最终值 .. #数目
  - 10 .. 20 .. #3 = { 10.0, 13.33, 16.66, 20.0 }
  - 10 .. 20 .. #5 = { 10.0, 12.5, 15.0, 17.5, 20.0 }
- 表达式四：起始值 .. #数目 .. 距离
  - 10 .. #5 .. 3 = { 10, 13, 16, 19, 22 }

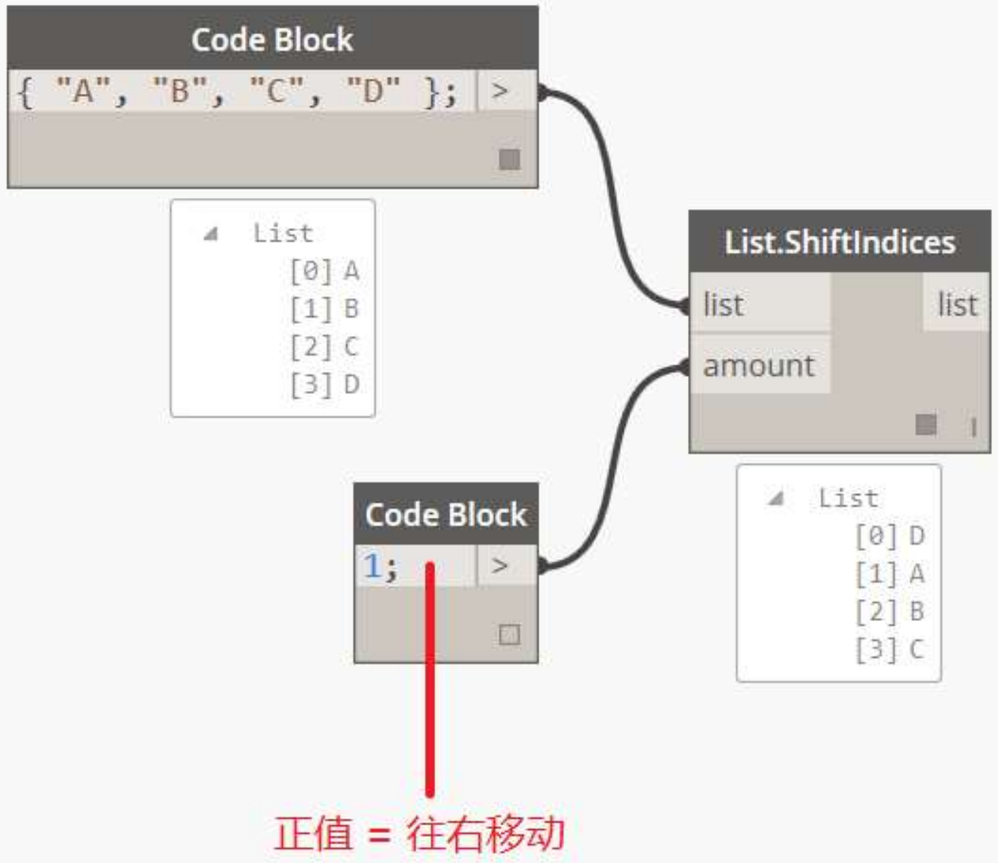
平移几何图形

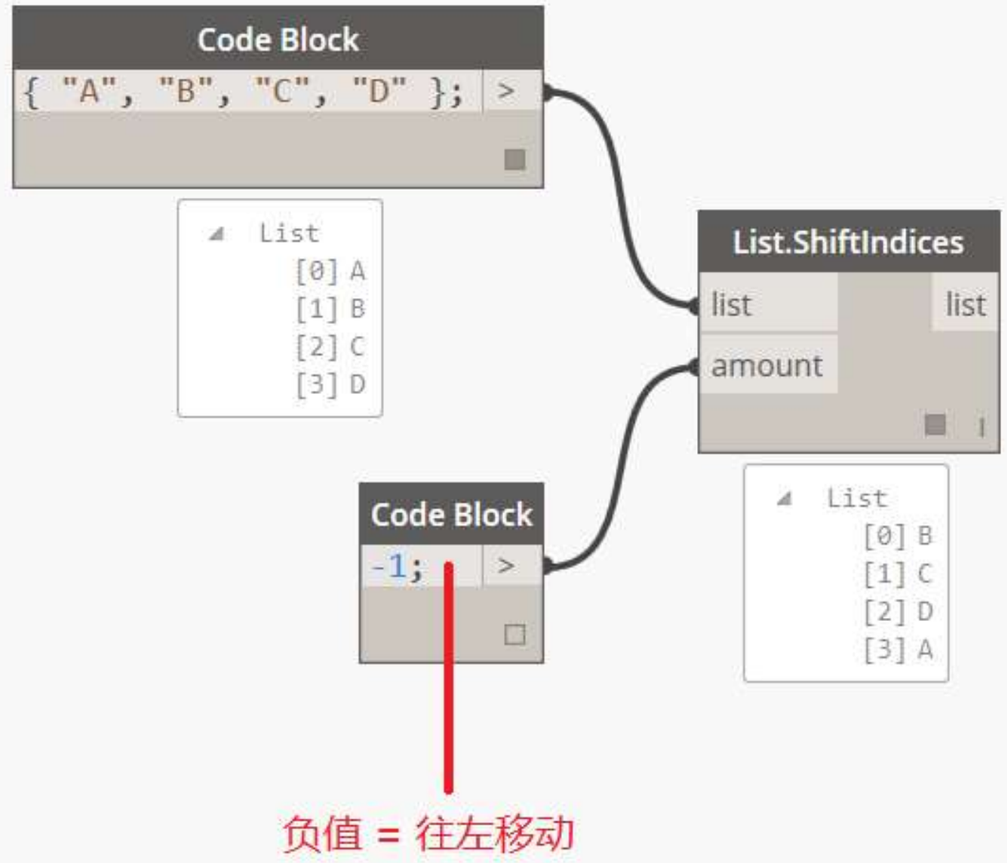
- 以向量移动并复制几何图形: Geometry.Translate



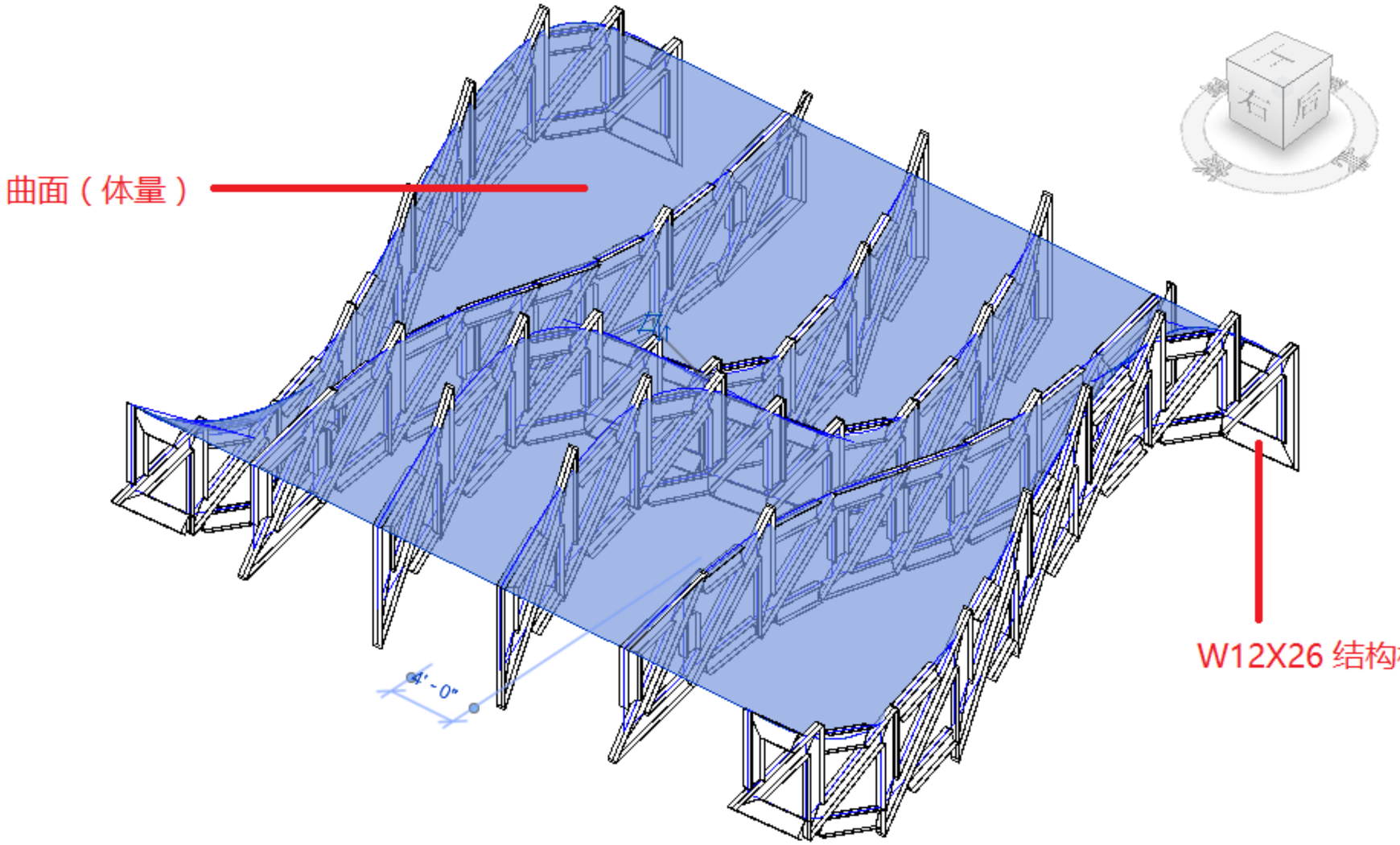
列表元素移动

- 将列表索引值往左/右移动: List.ShiftIndices

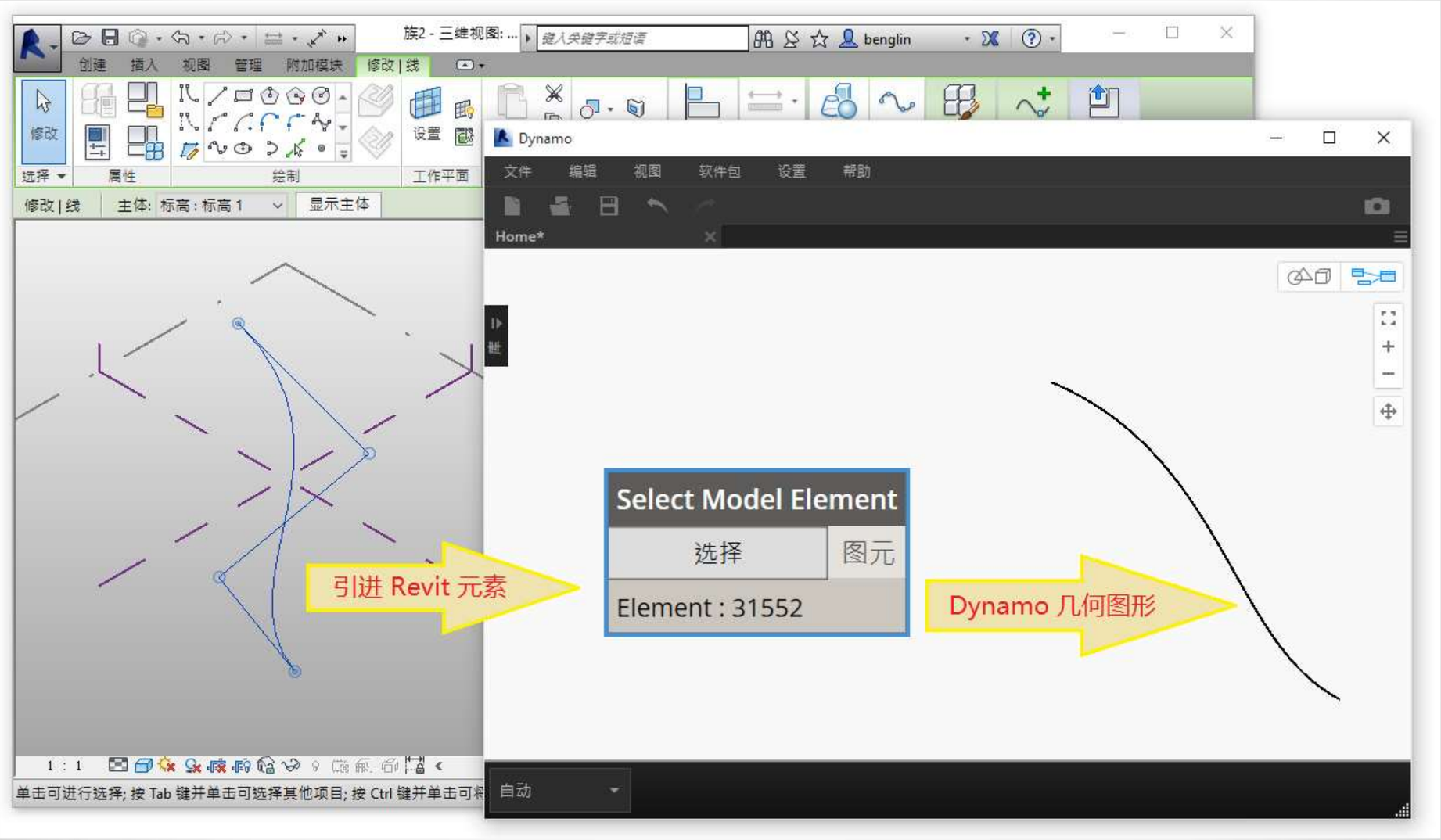




案例二：放置桁架结构

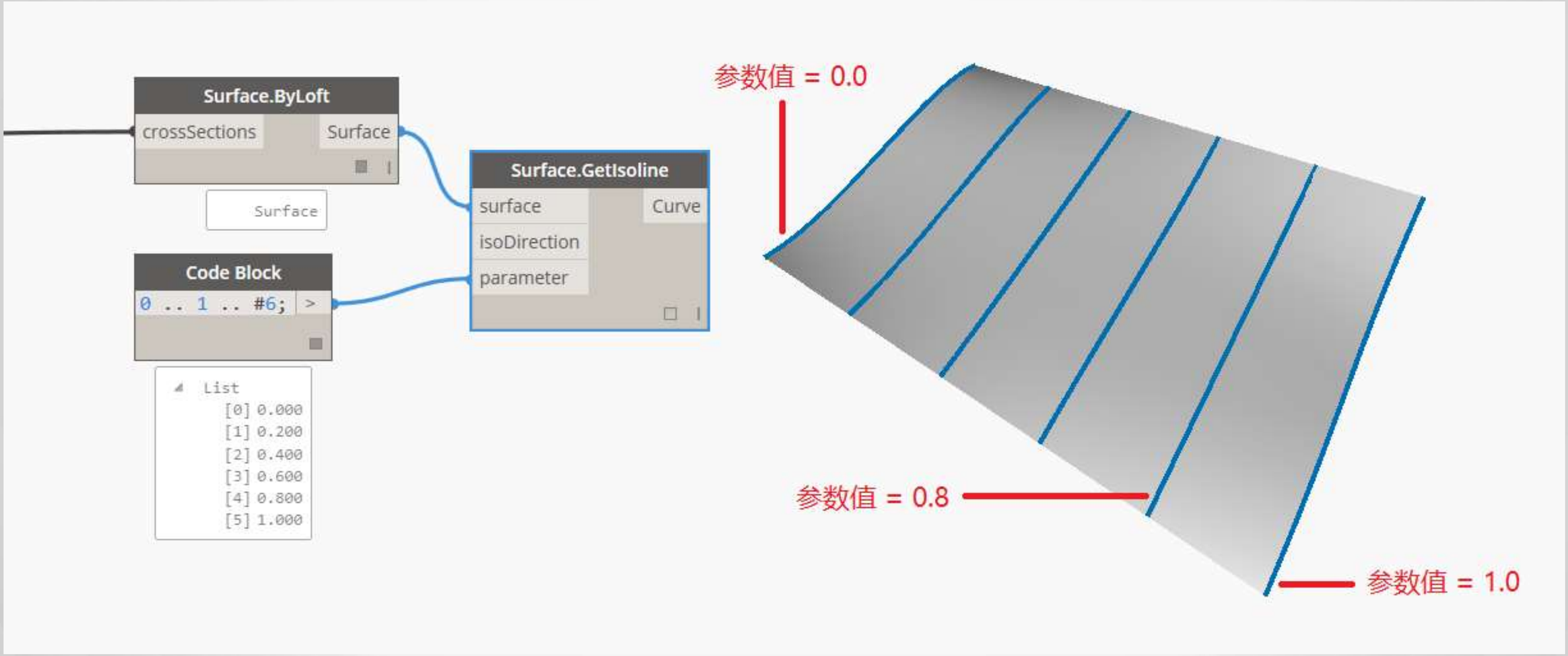


Revit Selection Node（Revit 选择节点）

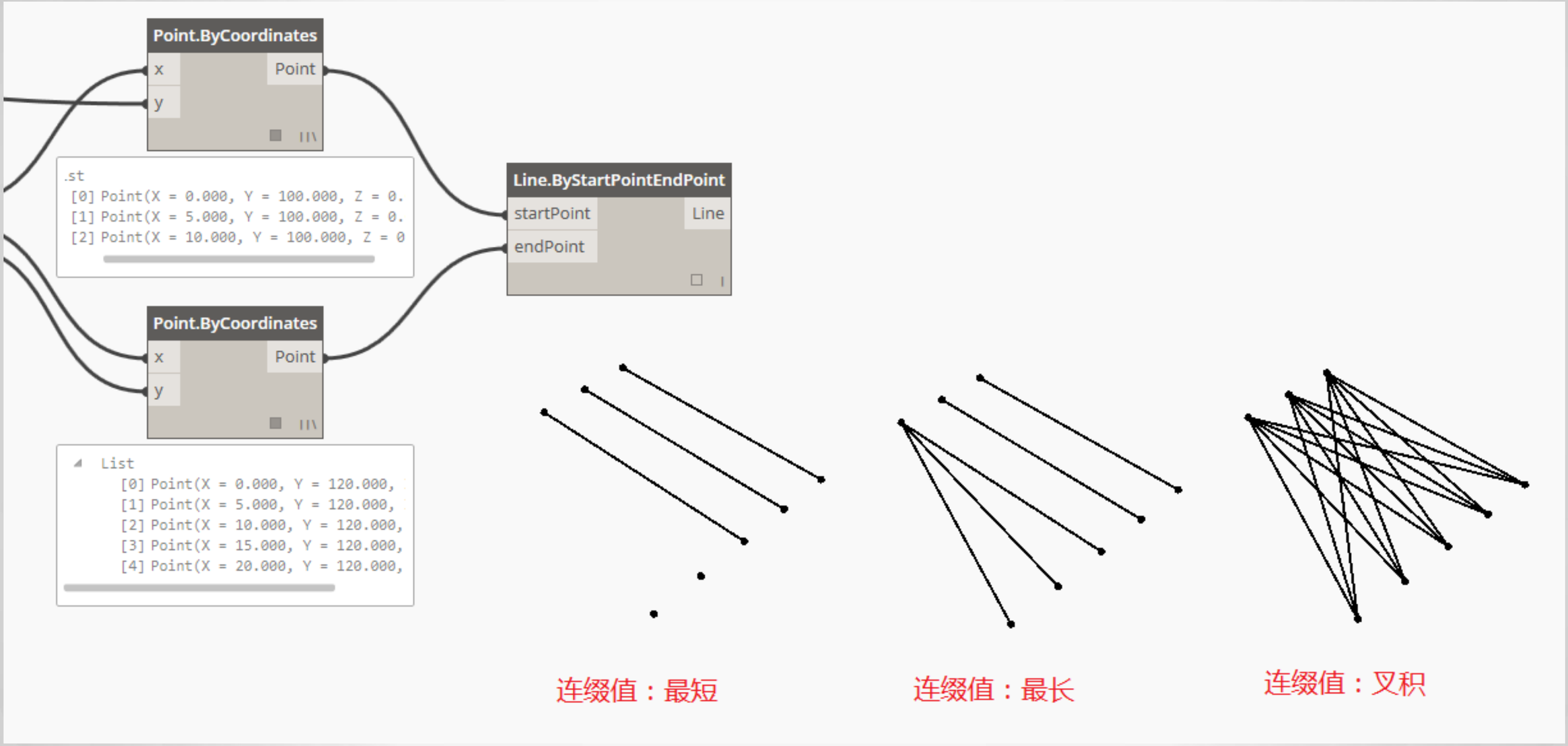


创建参数线（Isoline）

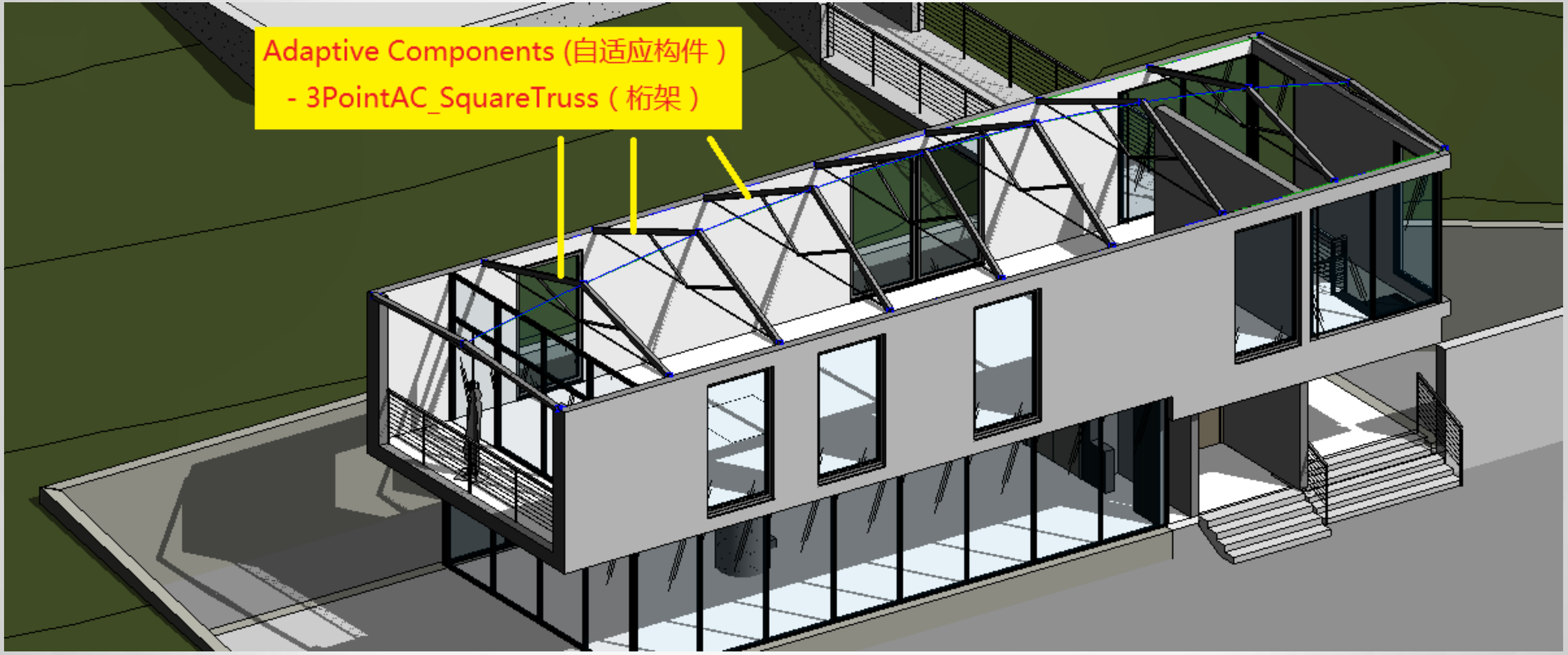
- 在给定曲面上创建参数线: Surface.GetIsoline



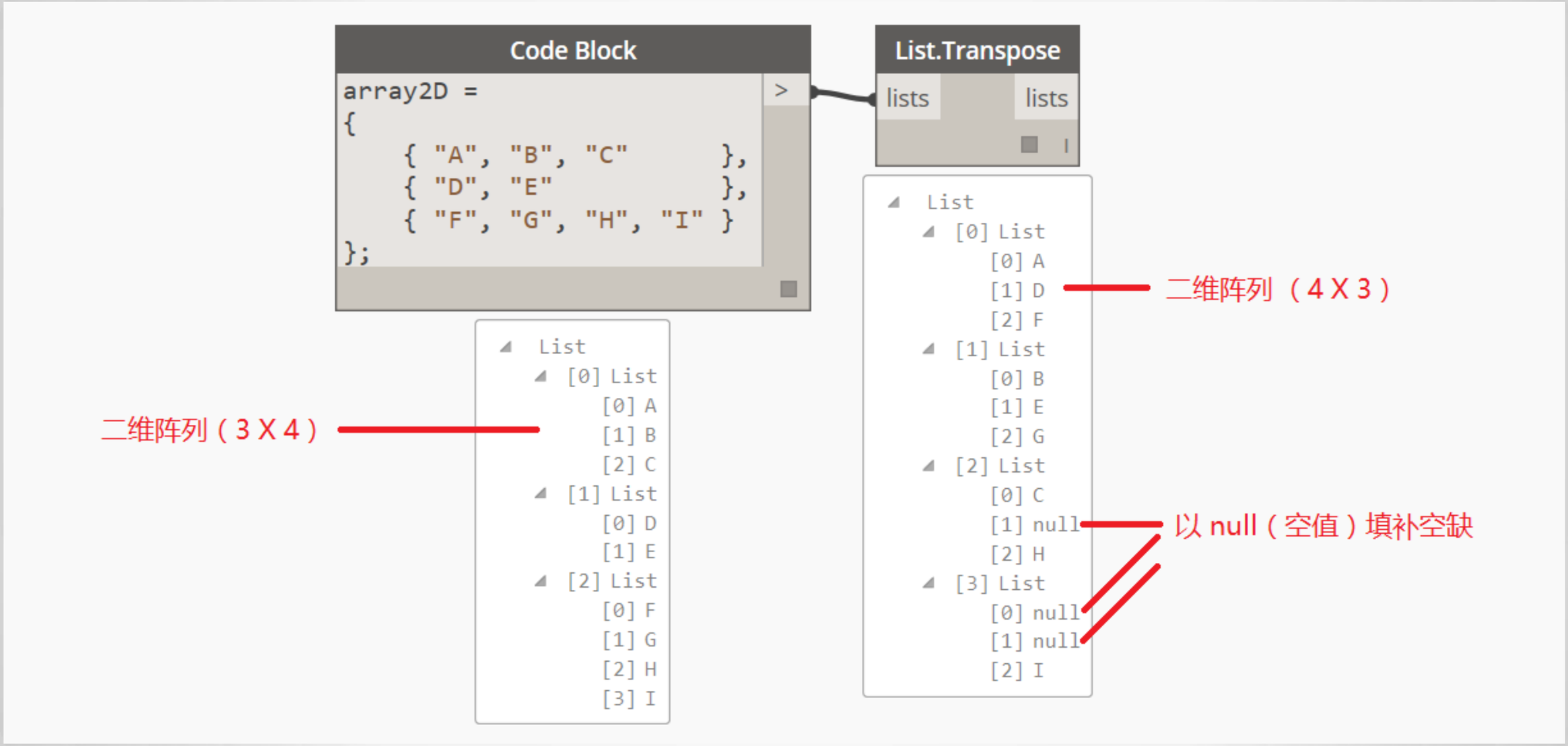
连缀设定与列表处理


Point.ByCoordinates
x
y
Point
.st
[0] Point(X = 0.000, Y = 100.000, Z = 0.
[1] Point(X = 5.000, Y = 100.000, Z = 0.
[2] Point(X = 10.000, Y = 100.000, Z = 0
Line.ByStartPointEndPoint
startPoint
endPoint
Line
Point.ByCoordinates
x
y
Point
List
[0] Point(X = 0.000, Y = 120.000,
[1] Point(X = 5.000, Y = 120.000,
[2] Point(X = 10.000, Y = 120.000,
[3] Point(X = 15.000, Y = 120.000,
[4] Point(X = 20.000, Y = 120.000,
连缀值：最短
连缀值：最长
连缀值：叉积

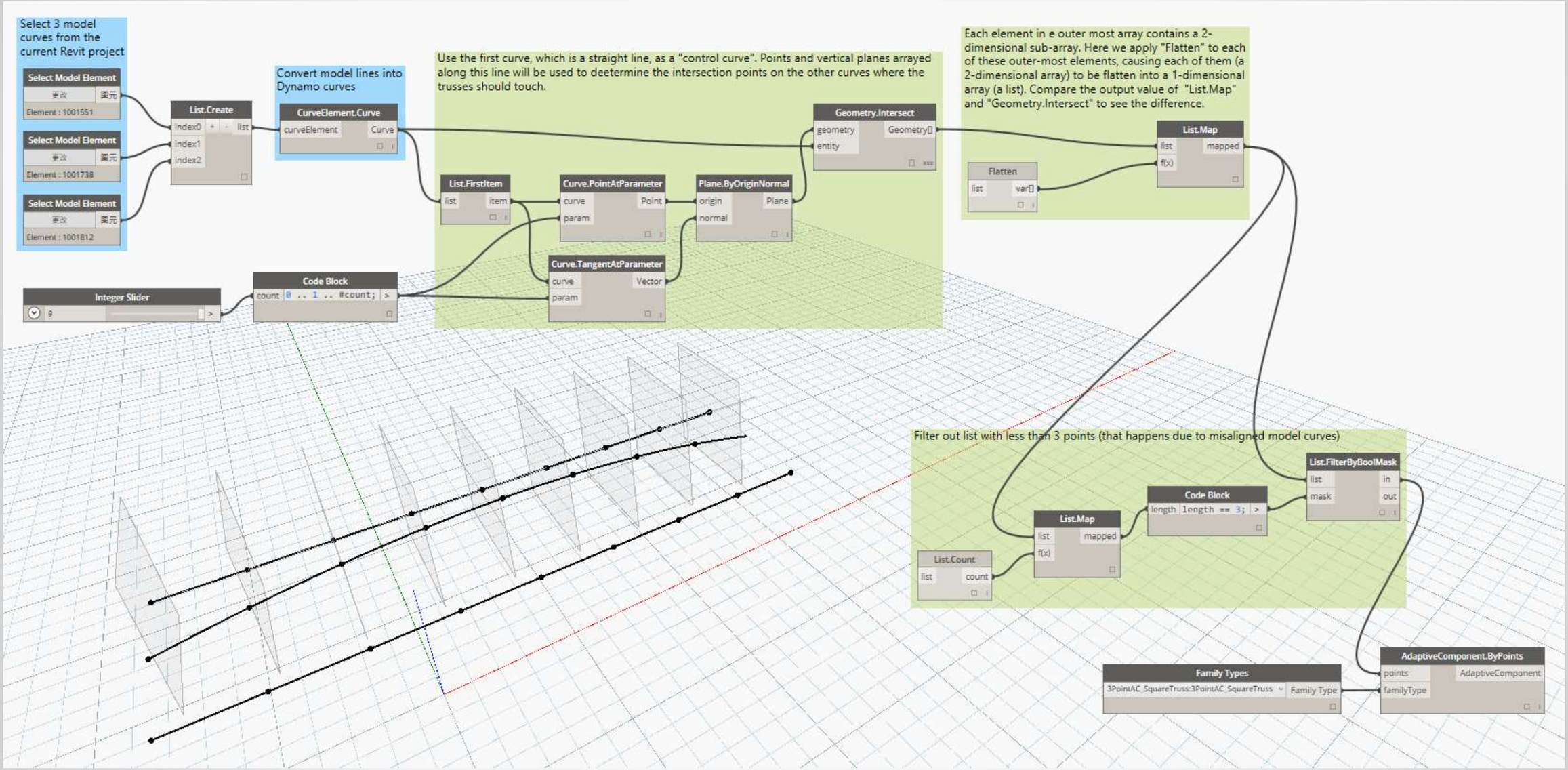
案例三：放置自适应构件(Adaptive Component)



转换二维列表的行和列

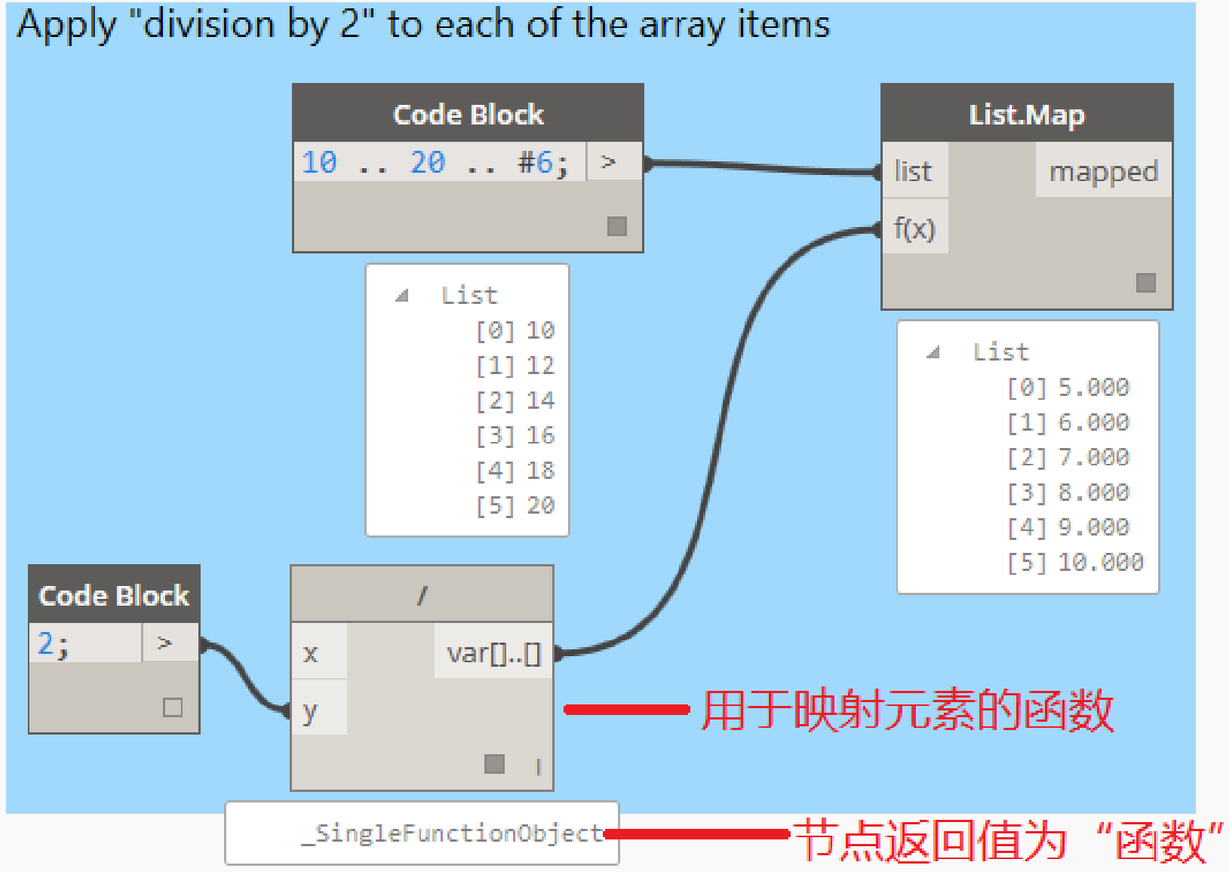

Code Block
array2D =
{
{ "A", "B", "C" },
{ "D", "E" },
{ "F", "G", "H", "I" }
};
List.Transpose
lists
lists
二维阵列（3 X 4）
List
[0] List
[0] A
[1] B
[2] C
[1] List
[0] D
[1] E
[2] List
[0] F
[1] G
[2] H
[3] I
List
[0] List
[0] A
[1] D
[2] F
[1] List
[0] B
[1] E
[2] G
[2] List
[0] C
[1] null
[2] H
[3] List
[0] null
[1] null
[2] I
二维阵列（4 X 3）
以 null（空值）填补空缺

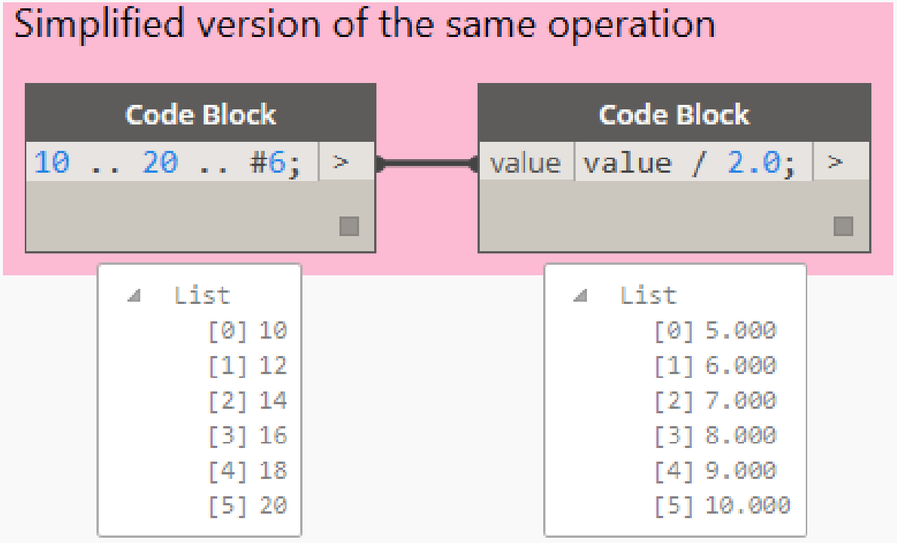
案例四：以平面放置自适应构件



List.Map 把函数应用到列表每个元素上

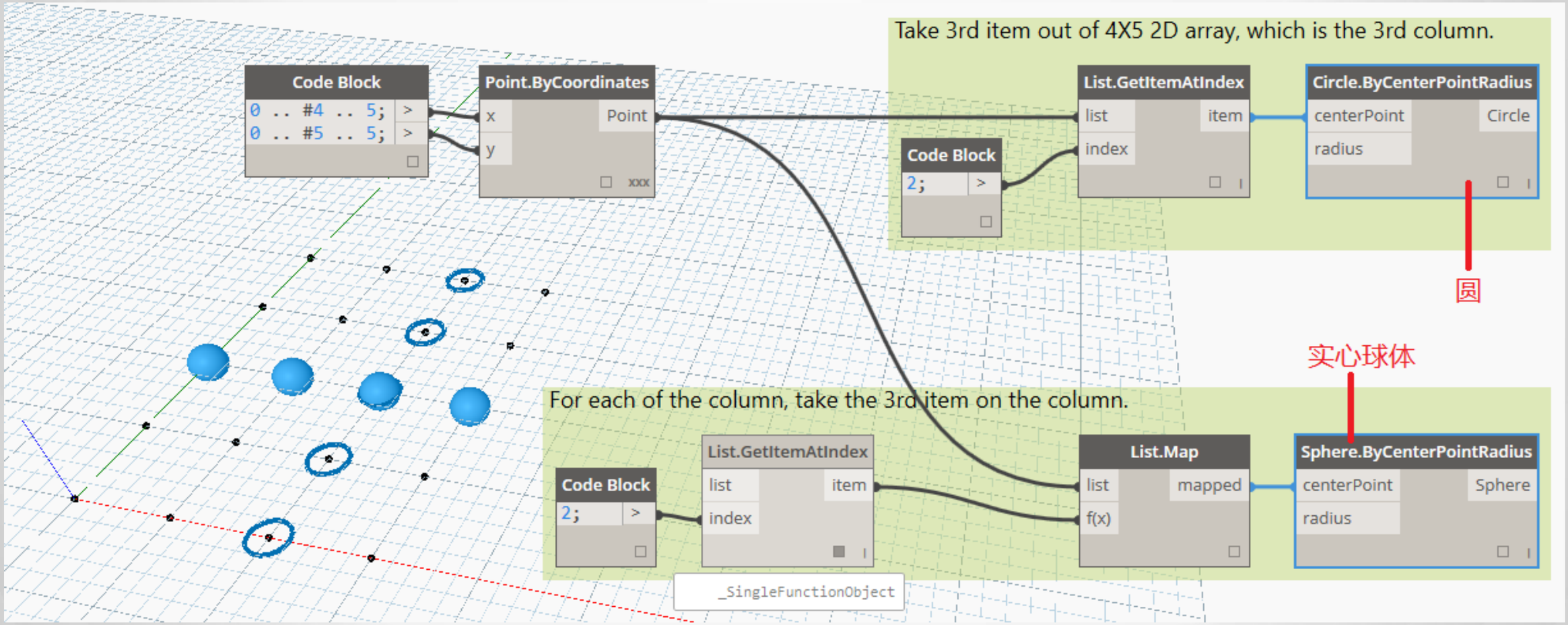
- 例子：将每个列表元素除于二



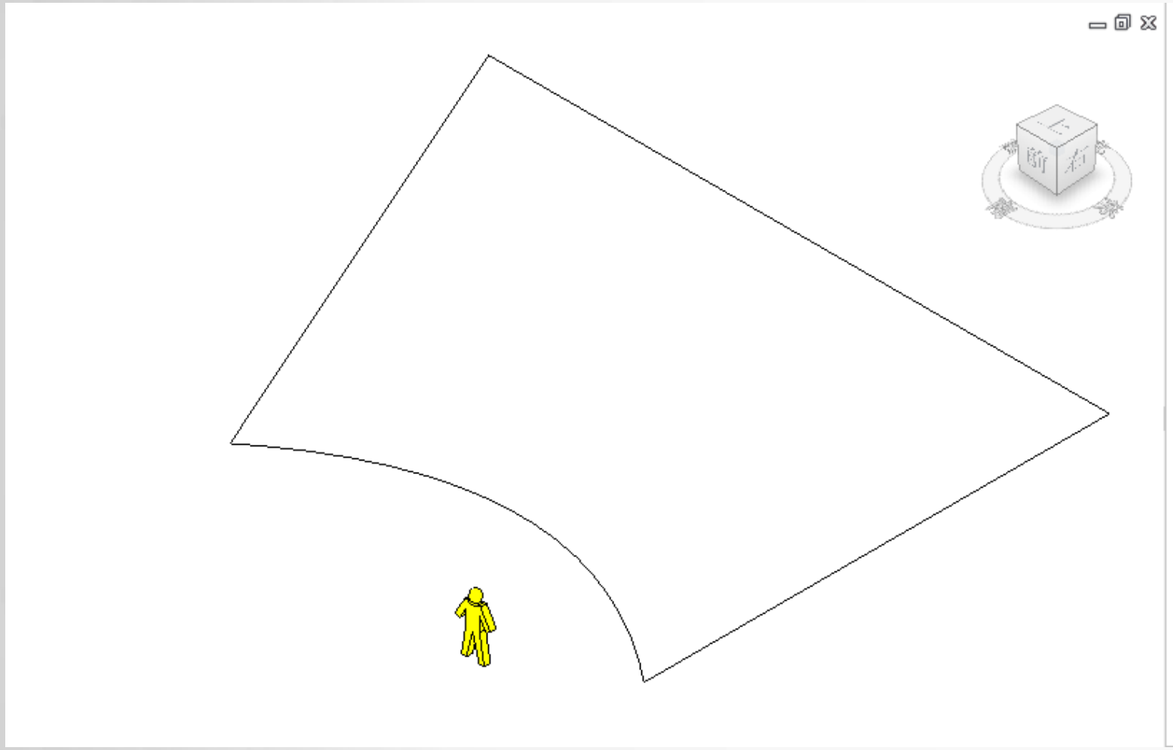


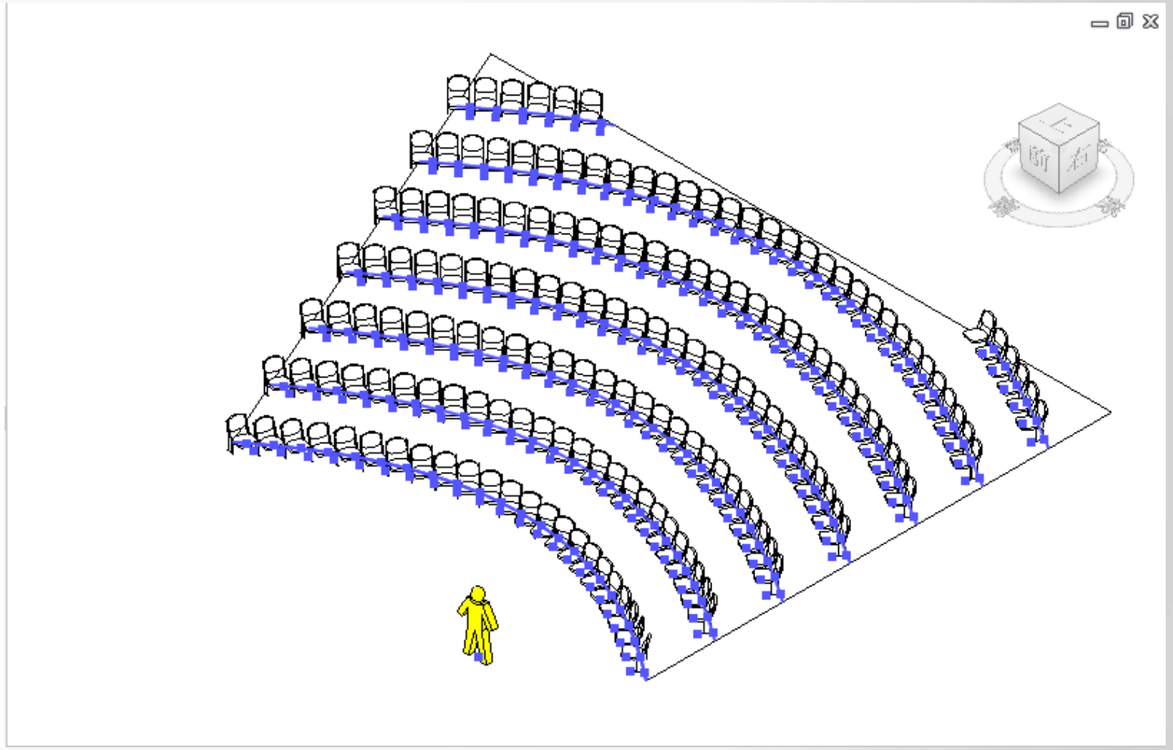
List.Map 较适用于二维或以上列表

- 例子：把函数映射到二维列表元素上

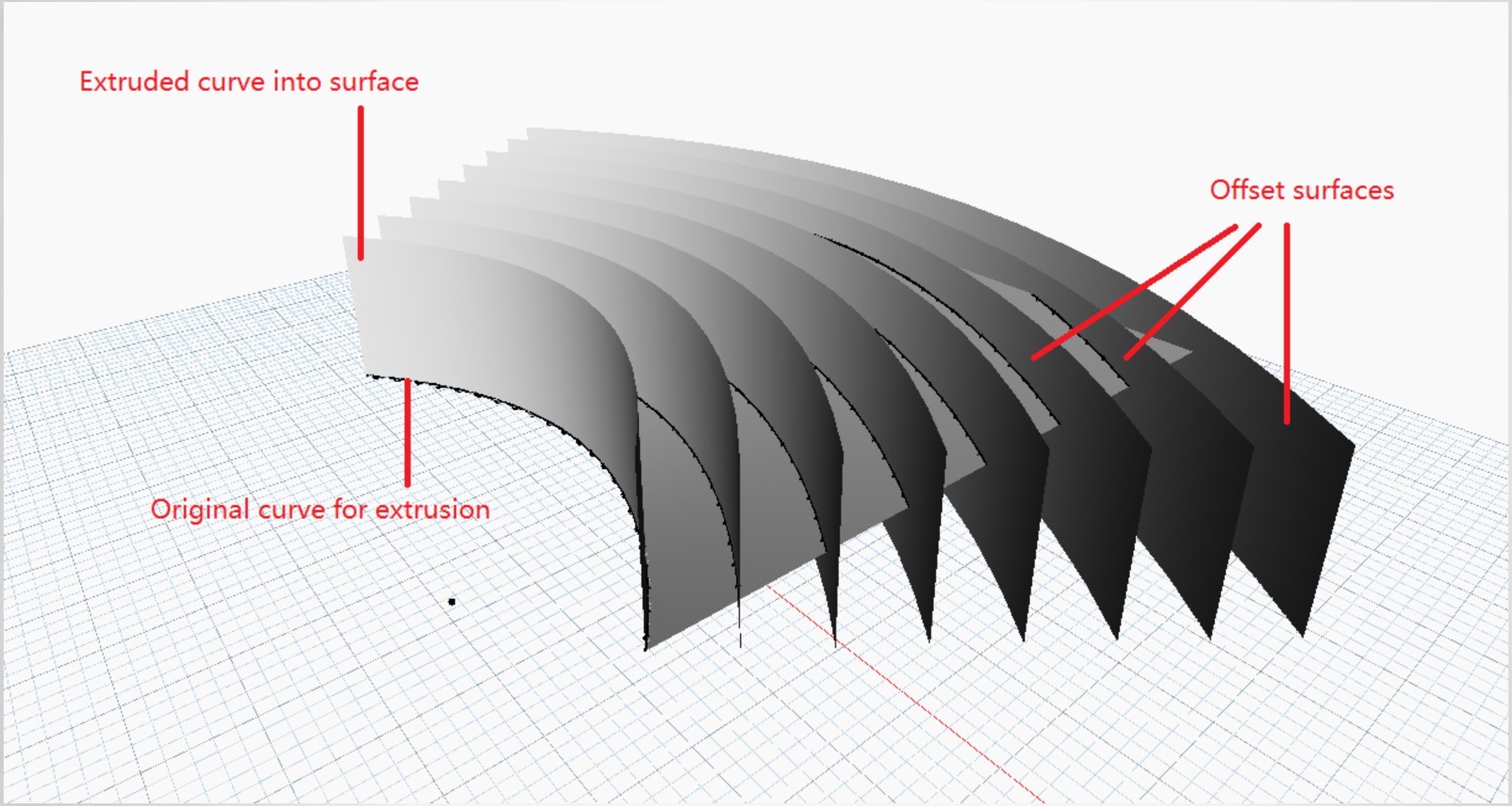


案例五：礼堂座位排列

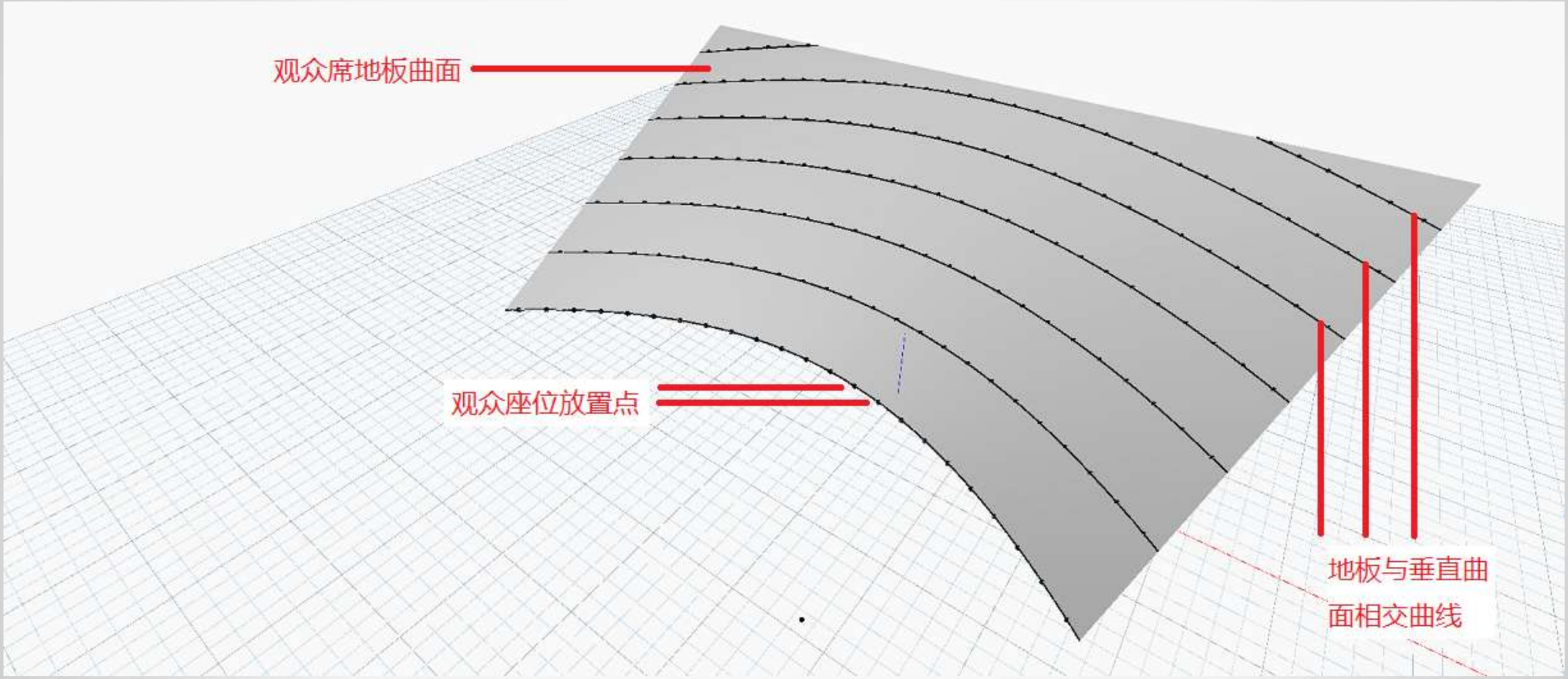




Curve extrusion and surface offset

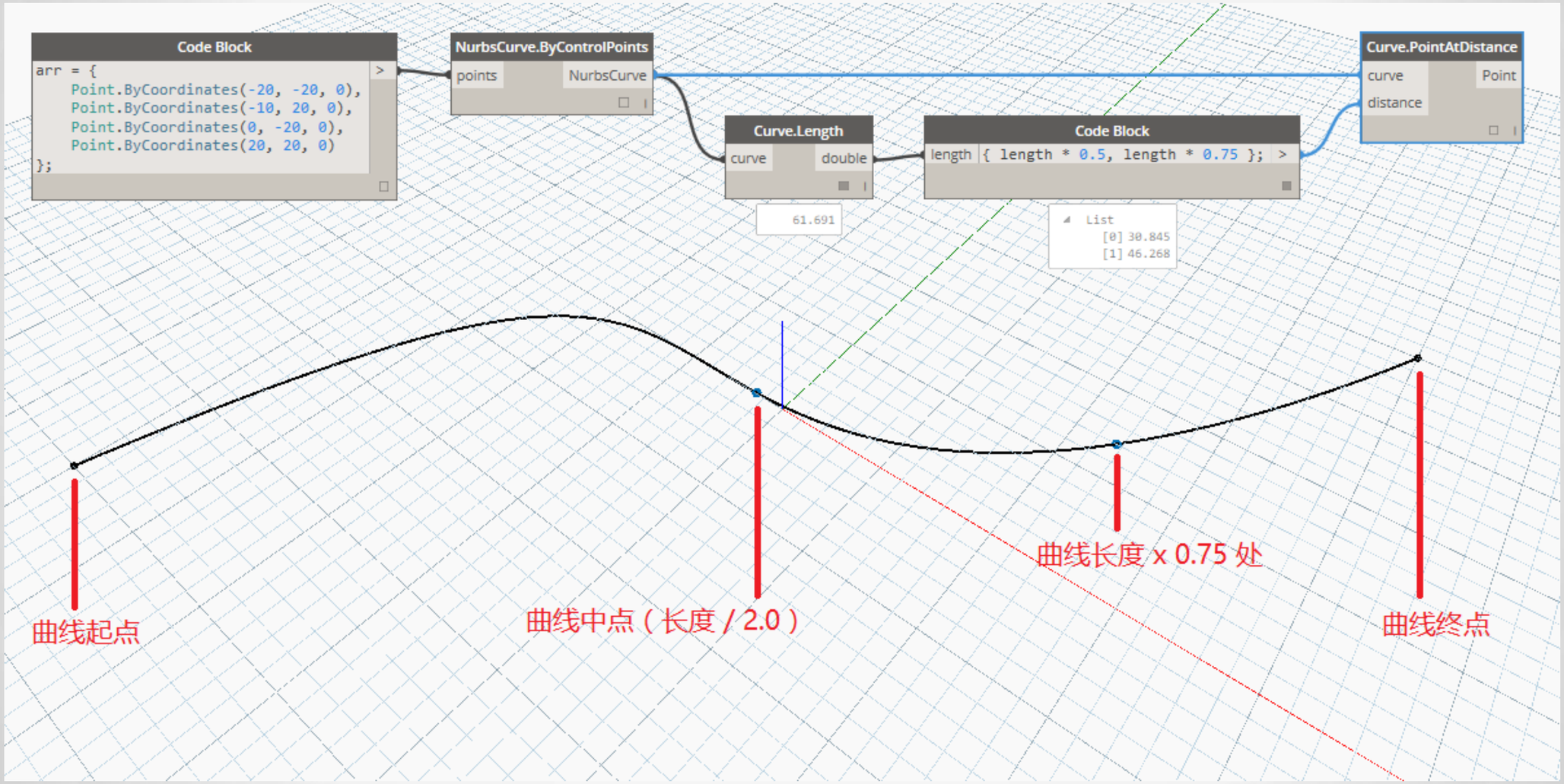


Curve on surface with points placed on them



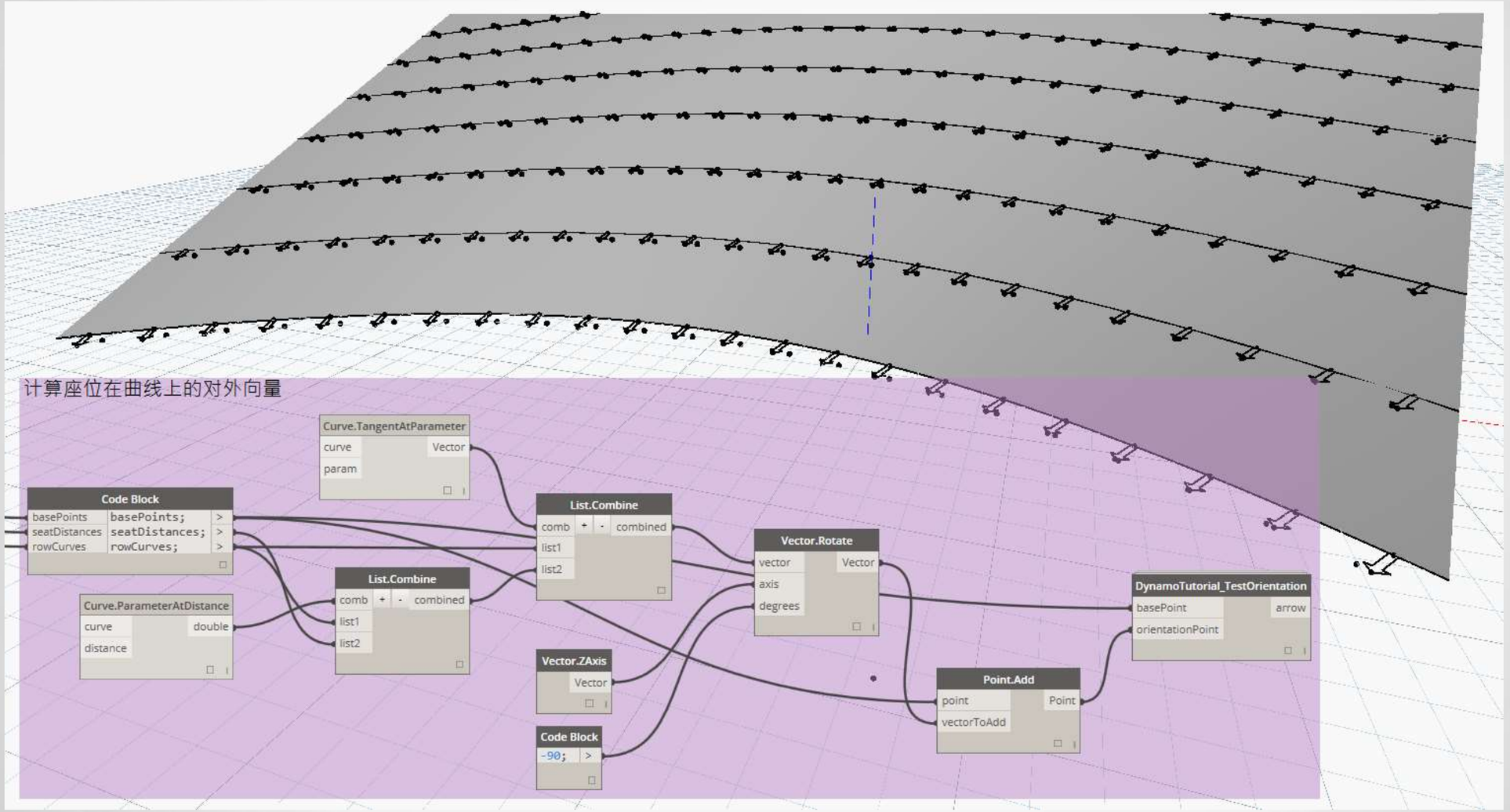
Curve.PointAtDistance

- 沿曲线获取特定弧长处的点



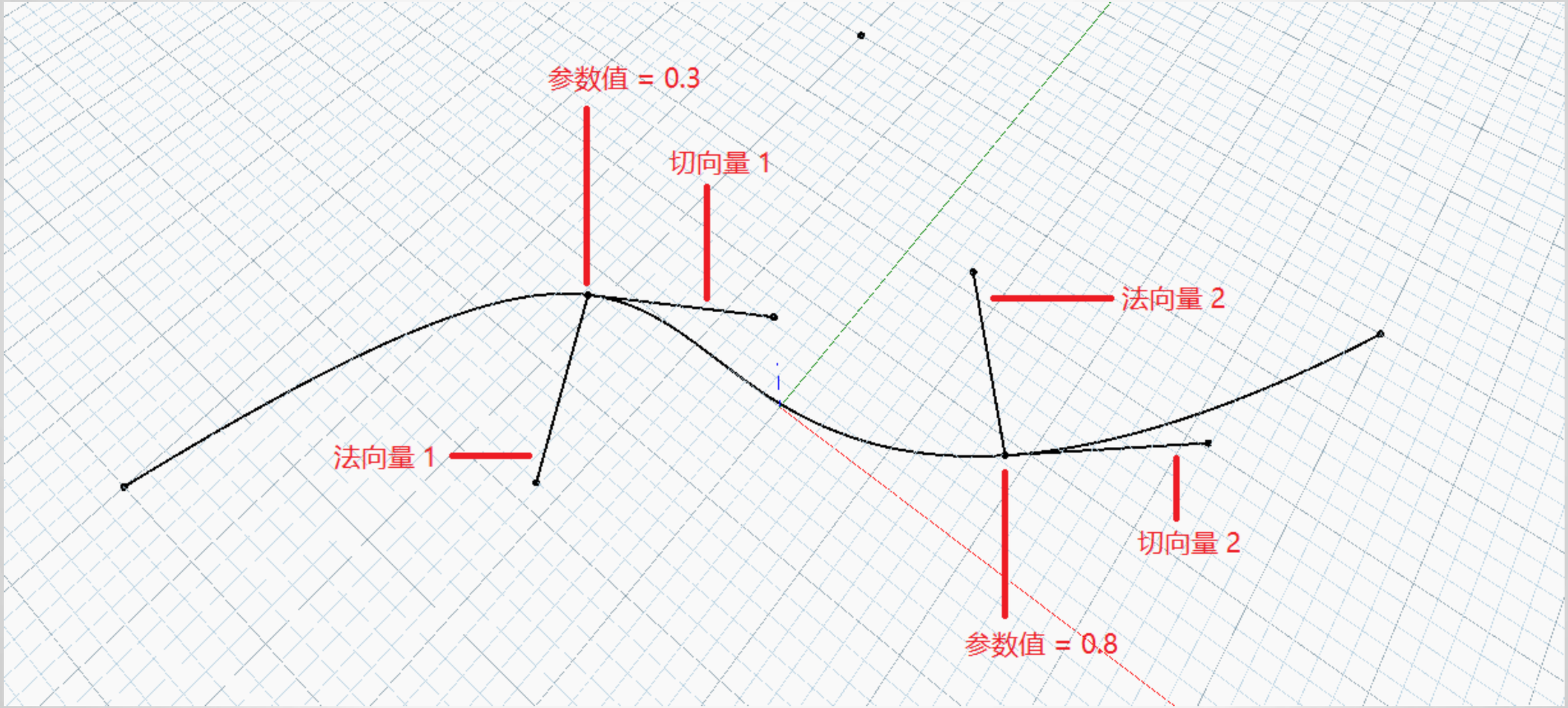
放置礼堂座位

- 找出每个座位与讲台之间的向量（Revit）

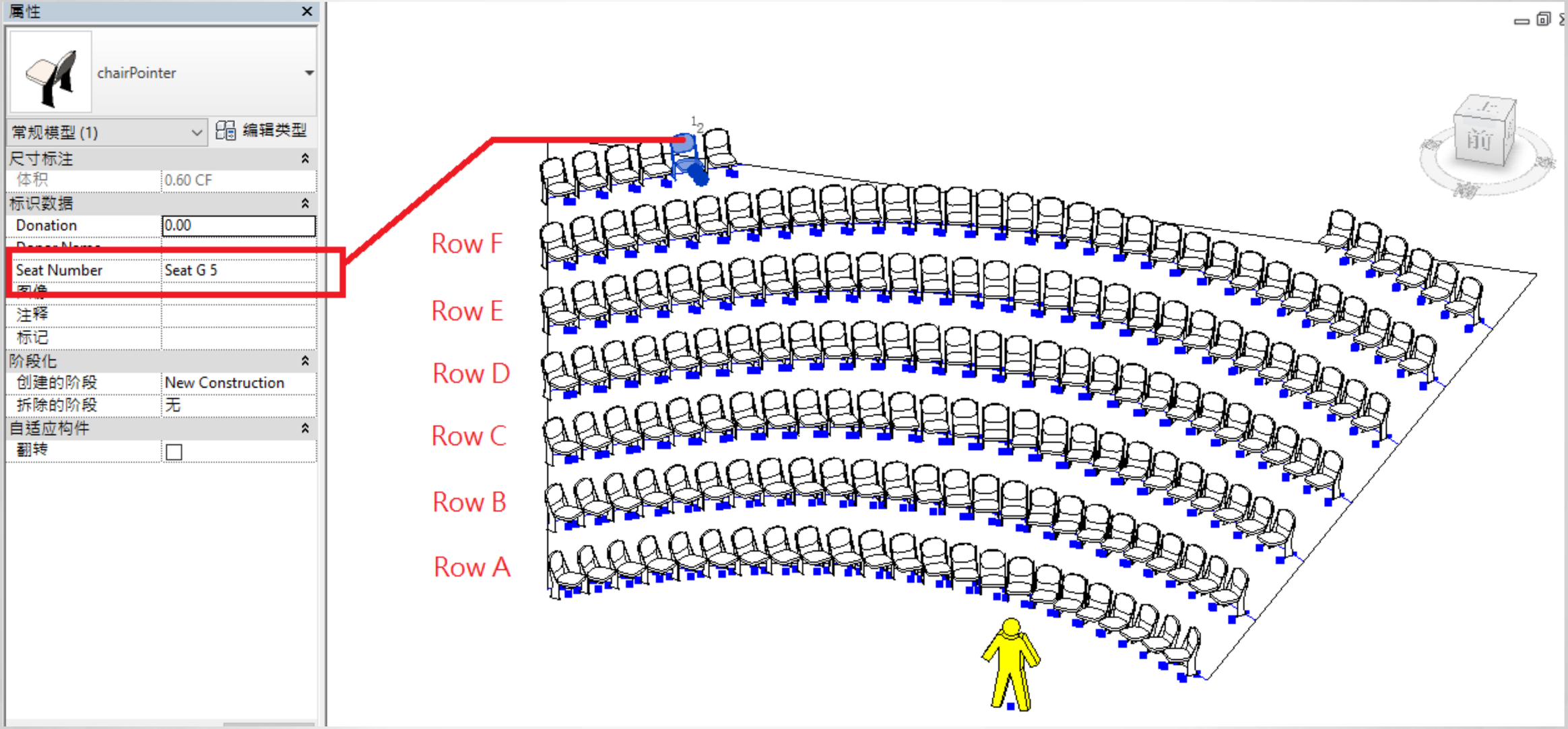


曲线法向量和切向量的差别

- 法向量方向不统一，切向量方向固定

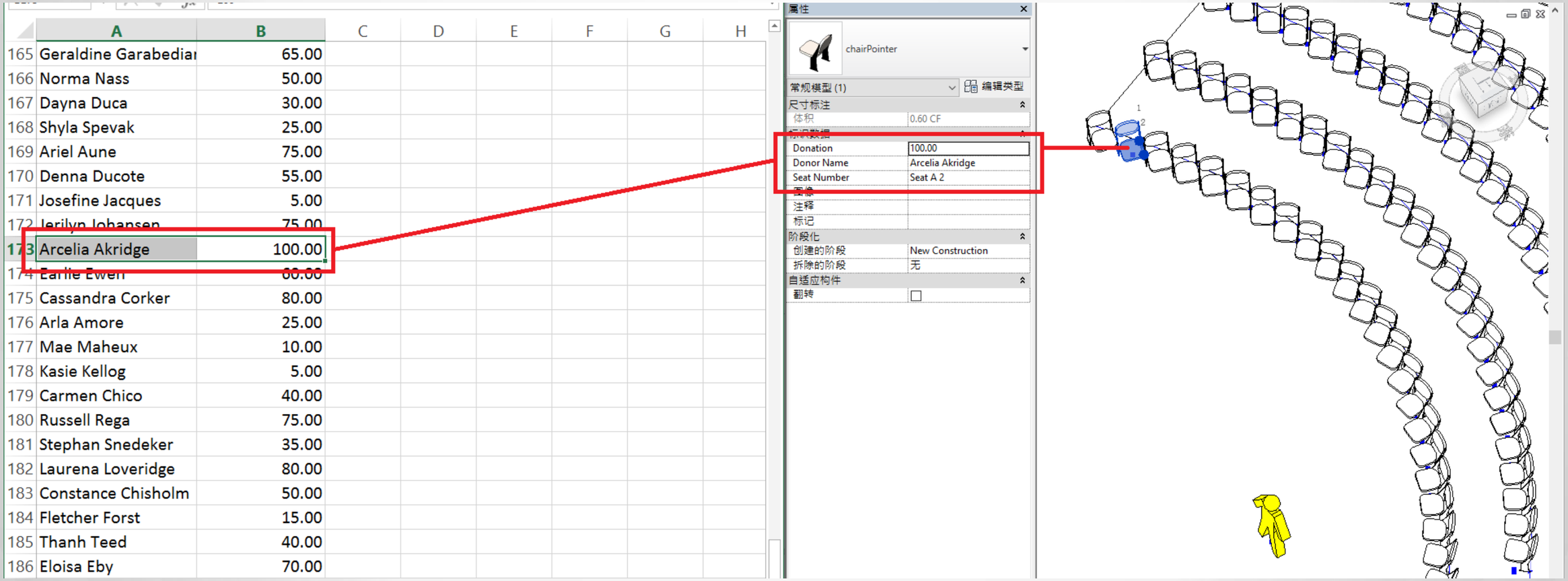


以标签 Seat A 1, Seat A2,... 标识座位



把表格式数据映射到座位上

- 以 Excel.ReadFromFile 读取表格式数据
- 以 Element.SetParametersByName 设置参数值



	A	B
165	Geraldine Garabediar	65.00
166	Norma Nass	50.00
167	Dayna Duca	30.00
168	Shyla Spevak	25.00
169	Ariel Aune	75.00
170	Denna Ducote	55.00
171	Josefine Jacques	5.00
172	Jerilyn Johansen	75.00
173	Arcelia Akridge	100.00
174	Earlie Ewen	60.00
175	Cassandra Corker	80.00
176	Arla Amore	25.00
177	Mae Maheux	10.00
178	Kasie Kellog	5.00
179	Carmen Chico	40.00
180	Russell Rega	75.00
181	Stephan Snedeker	35.00
182	Laurena Loveridge	80.00
183	Constance Chisholm	50.00
184	Fletcher Forst	15.00
185	Thanh Teed	40.00
186	Eloisa Eby	70.00

计算座位能见度

- 在Revit中以座位颜色深浅表示观众扭转角度