D.7 几 何 约 束 资 源

D.7.1 几何约束资源类型的 EXPRESS 描述应按表D.7.1 的规定采用。

表 D.7.1 几何约束资源类型的 EXPRESS 描述

类型	EXPRESS描述
边曲线 (HeCurveOr EdgeCurve)	TYPE IieCurveOrEdgeCurve -SELECT(IfcBoundedCurve. feEdgeCurve); END_TYPE
栅格坐标方向选择 (KeGridPlacement DireetionSeleet)	TYPE fcGridPlacementDirectionSelect =SELECT(IfeVirtualGridlntersection, lfeDrecticn); END_TYPE
点或顶点 (fcPointOr VertexPoint)	TYPE IePoinsOrVerteaPoint -SEIFCT(lfePoint, lfcVertexPoint); END_TYPE
实体或壳 (lfcSolidOrShell)	TYPE licSolidOrShell -SELECT(lfeSdidModd. lfcClosedShell); END_TYPE
表面或面 (lheSurfaceOr FaceSurface)	TYPE NeSurfaceOrFaceSurface -SEIECT(16-Suface lfcFaceSurface, lfcFaceBosedSurlaceModel); END_TYPE

D.7.2 几何约束资源实体的 EXPRESS描述应按表D.7.2的规定采用。

表 D.7.2 几何约束资源实体的 EXPRESS 描述

类型	EXPRESS描述
连接几何曲线 (IfeCoanretion Carwfmetry)	ENTTTY IfkConnectionCarveGecmetp SUBTYPE OF IfkConnecticeGecometry, CurveOnRlatingEement :IfeCarveOrEdgeCurve; CarwOnRlatsdFlmunt .OPTIONAI.HCarveOrEdgeCurver END_ENTITY
连接几何 (IfeConnrction Geemetry)	ENTITY IfeConnectionGeometry ABSTRACT SUPERTYPE OF(ONEOF(IlConnectionCurveGeometry,IlcConnectionPointGeometry,IfeConnection SurfaceGeometry,IfeConnectionVolumeGeometry)); END_ENTITY
连接点偏心 (HicConnection PointEecentricity)	ENTTTY IfcConnection PointEecentricity SUBTYPE OF IfkCoenecticnPointGeometry; EecentrictyinX:UPTIONAL.feLangthMeisurer EeeentridtylnY:OPTIONAL.IfelengthMessure; EecentricitylnZ:OPTIONAL.IfeLangthMessure; END_ENTITY
连接点几何 (IeCoanection PointGeometry)	ENTITY IleConnectionPointGecmetry SUPERTYPE OF(IHcConnectionPointEccentricity) SUBTYPE OF IkConnectioeGeometry; PoinsOnRelatingPement:fcPoinsOrVertesPoint; PoinrOnRlatedElemnt :OPTIONAL.IfaPtinrOrVertexPoint; FND_FNTITY

类型	EXPRESS操述
连接表面几何 (lfeConnection SurfaoGeometry)	ENTTTY IicConnectionSurinceGeometry SUBTYPE OF IicConnectionGcometry; SuraceOhRelatingElement,HfcSurfaceOhFaceSurfacen SuraeOhRelstedElement :OPTIONAl.IfeSurfaceOrFaceSurface; END_ENTITY
连接体积几何 (IfeConnection VolumsGeometry)	ENTTTY IicConnectionVolumeGccmetry SUBTYPE OF IfcConnectionGeometry; VolumeOnRelatingElement:licSodOrShell; VolumsOnRlatedFement,OPTIONAI 1t-CAAOeLI, END_ENTTTY
糖格轴 (lfcGridAxis)	ENTITY HcGrdAxis; AxisTg:OPTIONAL.HeLabel; AxisCurve:HcCurve; SameSense,IfcBoolean; INVERSE ParOW:SET [0,1]OF IcGrd FOR WAxes; PartOIV,SET [0,1]OF HeGnd FOR VAxes; ParOfU:SET [0;1]OF IkGnd FOR UAxes; HasIntersextions:SET OF IfecVirtunlGrdintersecton FUK IntersecingAxesi WHERE WR1:AxisCurve.Dm=2; WR2,(SIZEOF(PanOfU)-1)XORSIZEOF(Part0(V)-1)XOR(SLZEOF(ParOIW)-1) END_ENTITY
栅格坐标系 (lfeGrdPlacement)	ENTITY IfeGrdPLacement SUBTYPE OF HcObjectPlacement; PlacementLocation,licVirtalGridInterxection; PlacementRefDrection:OPIONAL.HeGrndPlacementDireetonSeleet; END_ENTTTY
局部坐标系 (lfel ocalPlacement)	ENTITY fcLecalPlacement SUBTYPE OF IcObjectPlacement; PucementRdTo:OPTIONAL.IfeObjextPlacement; RelativePlacement,IfcAxis2Placement; WHERE WR21:1f<CorrectLocalPlacement(RelativePlacement.PlacementRdTo); END_ENTITY
对象坐标系 (HeObjectPlacement)	ENTITY HeObjcctPlacement ARSTRACT SUPERTYPE OF(ONEOF;HeGrdPucement,IfeLocalPlacement)); INVERSE PacsOAjeet:SET[0:?]OF McProdhxt FOR ObjectPlacementi ReferencedByPlacements:SET OF feLacalPlarement FOR PlacementReIToy END_ENTITY
虚栅格交点 (HeVirtul GndIntersection)	ENTTTY HeVirtusXGrdlIntersecticn; IntersertingAxrs:LIST [2:2]OF UNIQUE fcGridAxis; OfsetDistances:LIST [2:3]OF 1KcLengluMcsue, END_ENTITY

D.7.3 几何约束资源应采用正确局部坐标系(If-CorrectLocalPlacement) 函数，函数的 EXPRESS 描述应符合下列规定：

FUNCTION IfeCorrectLocalPlacement

(AxisPlacement;IfcAxis2PLacement;

RelPlacement:IfcObjectPlacement);LOGICAL;
1F(EXISTS(RelPlaeement))THEN

```
        IF(IFCGEOMETRICCONSTRAINTRESOURCE.IFCGRIDPLACEMENT    IN    TYPEOF(Rel-
Placement))THEN
        RETURN(?)
    END_IF;
        IF(IFCGEOMETRICCONSTRAINTRESOURCE.IFCLOCALPLACEMENT·IN        TYPEOF
(RelPlacement))THEN
            IF(IFCGEOMETRYRESOURCE.IFCAXIS2PLACEMENT2DIN    TYPEOF(AxisPlace
ment))THEV
            RETURN(TRUE);
        END_IF;
        IF(IFCGEOMETRYRESOURCE    IFCAXIS2PLACEMENT3D·IN    TYPEOF(AxisPlace-
ment))THEN
        IF(RelPlacement\IfcLocalPlacement.RelativePlacement.Dim    =3)THEN
            RETURN(TRUE);
        ELSE
            RETURN(FALSE);
        END_IF;
    END  IF;
    END_IF;
  ELSE
    RETURN(TRUE);
  END_IF;
  RETURN(?);
END_FUNCTION
```

D.8 几 何 模 型 资 源

D.8.1 几何模型资源类型的 EXPRESS 描述应按表 D.8.1 的规定采用。

<div align="center">表 D.8.1   几何模型资源类型的 EXPRESS   描 述</div>

类型	EXPRESS描述
布尔运算符 (lfeBoolean Operator)	TYPE IlcBoleasOyeator -ENUMERATON OF(UNION. INTERSECTION, DIFFEREYCE) y END_TYPE
布尔运算项 (H-RooleanOperan)	TYPE IieboleamOyerand -SELECT lfeSidModdl. lfc HalfSpaceSolid, f-BoolranRrsult. lfcCsgPrimitive3D); END_TYPE
CSG选择 (lfeCsgSeleet)	TYPE IfcCsgSelect -SELECT(lfcBooleanResult, lkeCrgPrimutive3D); END_TYPE
几何集选择 (lfeGeometrie SetSeleet)	TYPE IieGeometricSetSelect =SELECT(IfcPoint, 1fkCurve, 16.Suface) END_TYPE

D.8.2 几何模型资源实体的 EXPRESS 描述应按表 D.8.2 的规定采用。

表 D.8.2　几何模型资源实体的 EXPRESS 描述

实体	EXPRESS描述
高级边界表达 (lieAdvancedBrep)	ENTITY IfcAdvancedBrep SUPERTYPE OF(IfeAdvancedBrep WithVoids) SUBTYPE OF HeManifodSolidBeep; WHERE HasAdvancedFaces;SLZEOF(QUERY(Als<・SEIF\IfeManifoldSolidBeep.Outer.CfsFaces I (NOT('IF CTOPOLOGYRESOURCE.IFCADVANCFDFACE IN TYPEOF(Afs)))))=0; END_ENTITY
带孔洞高级边界表达 (IKeAdvancedBrep WithVoids)	ENTTTY HcAdvancedBrepWithVoids SLBTYPE OF fcAdvancedHrePi Voids:SET [1:?]OF lfcClosedShell: WHERE VoidsHave.AdvaneedFaces,SIZEOF(QUERY(Vsh<・VoidsI　　　SLZEOF(QUERY(Afs< Vah.CIsFaces I(NOT CIPCTOPOLOGYRESOURCE.IFCADVANCEDFACE IN TYPEOF(Afs)))))=0))=0; END_ENTITY
块 (IfeBlock)	ENTITY HeBock SUBTYPE OF HeCsgPrimitive3D; XLength:HcPositiveLengthMeasure: YLength:IfePositivel engthMeasure; Zlength:IfcPositiveLengthMeasure; END_ENTITY
布尔剪辑结果 (IicBoolean CtppingResult)	ENTTTY IfeBeolearClipgingResalt SUBTYPE OF IfcBooleanResult; WHERE FirstOperandType:(IFCGEOMETRICMODELRESOURCE.IFCSWEPTAREASOLIL IN TYPEOF(First OPerand)》OR CIFCGEOMETRICMODEI RESOURCE.IFCSWEPTDISCSO ID IN TYPEOF(Fir*Oper and))OR CIFCGEOMETRICMODELRESOURCE.IFCBOOLEANCLIPPINGRESULT IN TYPEOF(First Operand)); SecondOperandType :CIFCGEOMETRCMODELRESOURCE.IFCHALFSPACESOLIDY IN TYPEOF(See ondOperand)); OperatorType,Operator -DIFFERENCE; END_ENTITY
布尔结果 (TfcBooleanResult)	ENTITY HcBooleanResult SUPERTYPE OF(HeBcoleanClippingReeult) SUBTYPE OF IcGeometricRepresentaticmltem: Operator,IfcBooleanOperator; FirstOperand:HfcBooleanOperand; SeeondOperand :IfcBeoleanOperand; DERIVE Dm,HeDimensiceCount ,-FirstOperind.Dim; WHERE SameDm,FirstOperand.Dim =Scondnrusnd Nim END_ENTITY
包围盒 (lfeBoundingBox)	ENTTTY IfeBoundingBox SUBTYPE OF HcGeometrkRepresentatinltem; Comer:IfeCartesianPoint; XDim:IlePositivelangthMeasure; YDIm:HfcPositiveLengthMessure; ZDim,lfePositiveLengthMeasure; DERIVE Dim:HeDmensionCount:-3; END　ENTTY

续表D8.2

实体	EXPRESS捕述
半空间包围盒 (HfcBoxedHalfSpace)	ENTITY IkBoxedHalfSpace SUBTYPE OF IcHalfSpaceSolid; Encloeare :IicRondingBoxt END_ENTITY
笛卡尔点列 (IfeCartesianPointList)	ENTTTY IfeCartesianPointlist ABSTRACT SUPERTYPE OF(HeCartesiarPointList3D) SUBTYPE OF IfkGcometricRepresentationlkm; END_ENTTTY
三维笛卡尔点列 (HeCartesian PointList3D)	ENTITY IfcCartesianPointList3D SUBTYPE OF IKkCartesianPointlist; Coordlist:LIST [1:?]OF LIST [3:3]Of IfcLengthMeasure, END_ENTITY
三维C9G体素 (HfeCsgPrimitive3D)	ENTTTY If-CgPrimitive3D ABSTRACT SUPERTYPEOF(ONEOF(IBlock,HcRectangularPyramid,HfcRightCircularCone,lfeRight CircularCylinder,IfcSthere)) SUBTYPE OF IkGcometricRepresnntationlrm; Position,HcAxis2Placement3D; DERIVE Dm:leDimensionCount ;=3; END_ENTITY
CSG立体 (HeCsgScBd)	ENTITY IkC*Soid SUBTYPE OF lfeSoldModel; TreeRootEXPRESSoe:IfeCsgSleet; END_ENTITY
控伸体 (feExtrudedAresSolid)	ENTITY IfeExtrudedAreaSolid SUPERTYPE OF(IIcExtrudedAreaSolid Tapered) SUBTYPE OF IfeSweptAreaSdid; ExtrudolDireetion,IfeDreetiom; Depth,HfcPositivelengthMeasure; WHERE ValidExtrusionDireetion:ieDotProduct(IHeRepresentationltem()|I licGcometricRepresentaticeltem)II lfcDirectica([0.0,0.0,1.0]),SEIF.ExtrudedDirection)<>0.0; END_ENTITY
权律键 (HeExtrudedArea SolidTapered)	ENTTTY IfcExtrudedAresSolidTapered SUBTYPE OF IfeExtrudrdAreaSolid; tadsweptArea:llcrrotleLeli WHERE CoereetProfileAssigrmnt,HeTaperedSwep.AreaProfiles(SELF\IfeSweptAreaSdid.SweptArea,SEIF.End SweptArea); END_ENTTTY
基于面的表面模型 (HfeFaceBesed SurfnceModd)	ENTITY IfeFaceBasedSurfaceModel SUBTYPE OF IkGcometricRepresentationlem; FbsmFaces,SET[1,?]OF icConnectedFaceSet; DERIVE Dm:lteDimensionCount :=3; END_ENTITY
小面片Brep (lfeFacetedBeep)	ENTITY IfeFacetedBrep SUPERTYPE OF(licFacetedBrepWithVoids) SUBTYPE OF IfcManifoldSolkBrep END_ENTTTY
小面片空润Brep (IicFacetedBrep WithVeads)	ENTTTY fcFacetedBrepWithVoids SUBTYPE OF IKcFacetedBeep; Voids:SET[1;?]OF IfeClosedShell: FNNEVTITV

实体	EXPRESS操述
固定参考方向扫掠体 (fcFixedReference SwepeAreaSolid)	ENTITY HeFixedRelferenceSwepaAreaSdid SUBTYPE OF HeSweptAreaSolid; Dirextrix,HeCurve; SartPamm:OPTIONAL IfcParameterValue; EndParam:OPTIONAL.HcParaneterValue; FixeeRference;cDirection; WHERE DireetrixBounded:(EXISTS(SarnPann)AND EXISTS(EndPamm))OR(SIZEOF(IFCGEOMETRYRE SOURCE.IFCCONIC,"IFCGEOMETRYRESOURCE IFCBOUNDEDCURVE]·TYPEOF(Directrix))= 1): END_ENTITY
几何曲线集 (IieGeometrie CurveSet)	ENTTTY IfcGeometricCurveSet SUBTYPE OF IfcGeometricSet; WHERE NkSurfaces:SIZEOF(QUFRY(Temp<·SEI.F\HeGeometreSet.Elements I IFCGEOMETRYRE SOURCE.IFCSURFACE IN TYPEOF(Temp)))=0; END_ENTITY
几何集 (lfcGeometricSet)	ENTITY HcGeometricSet SUPERTYPE OF(HeGeometricCurveSet SUBTYPE OF IfcGeometricRepresentatimltem; Elements:SET[1:?]OF lfeGeometricSetSeleet; DERIVE Dim:HcDimensicrCount :=Eement[1].Dim WHERE ConsistentDem;SIZEOF(QUERY(Temp<·Elements|Temp.Dim >Elements[1].Dim))=0; END_ENTITY
半空间立体 (IfeHalfSpaceSolid)	ENTTTY HeHalfSpeceSolid SUPERTYPE OF(ONEOF(IfcBoxedHal Spsce.IfcPolygonalBoundedHslfSpece)) SUBTYPE OF HcGeometricRepresentationltem; BaseSurface:lfeSurface; AgrrementFlg:BOOLEAN; DERIVE Dim,HcDimensiceCount ;-3; END_ENTITY
流形立体Brep (IfeManifoldSolidBrep)	ENIII T HcMantolSoldBrep ABSTRACT SUPERTYPE OF(ONEOF:HcAdvancrdBrep.IfcFacetedBrep)) SUBTYPE OF IfeSolidModel; Outer :lfcClosedShell; END_ENTITY
多边有界半空间 (HePlygonalBounde HalfSpace)	ENTITY HfecPolygoalBoundedHalfSpace SUBTYPE OF feHalfSpaceSolid; Position,fcAxis2Placement3D; PolygonalBoundary:lfeBoundedCurve: WHERE BoundaryDim,PolygonalBoundary.Dim=2; BoundaryType:SLZEOF(TYPEOF(PolywonalBundary)·[IFCGEOMETRYRESOURCE. IFCPOLYLINE.IFCGEOMETRYRESCURCE.IFCCOMPOSITECURVE])-1: END_ENTITY
四校锥 (lfcRextangular Pyramid)	ENTTTY HcRectangularPyramid SUBTYPE OF IfeCsgPrimitive3D; XLength:HiePositiveLergthMessure; YLength:IfcPositivelengthMeasure; Height,HcPositiveLengthMeasure; END_ENTTTY

续表D8.2

实体	EXPRESS捕述
旋转体 (HfeRevolved AresSolid)	ENTITY IfeRevolvedAreaSdld SUPERTYPE OF(IicRevolvedAreaSolidTapered) SUBTYPE OF IkcSweptAreaSolid; Ais:feAxislPlacement; Angle:HePlaneAngleMeasures DERIVE AusLine,IfeLine s—IfeRepeesentatioelten()II TieGeometricRepresentationltem)II HfeCurve()II If dLine(Axis,Location,HcRepresentationltem()|I licGeometricRepresentationltem()|I IicVector(Axis.Z. 1.0>); WHERE AxisSartInXY:Axis.Location.Coordinate[s]-o.e. AxisDirectionlnXY:Axis.Z DirectionRatios[3]=0.0; END_ENTITY
锥形旋转区域 (IfcRevolvedArea SolidTapere)	ENTITY IfcRevolvedAreaSolidTapered SUBTYPE OF IkRevolvedAreaSoid; EndSweptArea,IfeProfileDef; WHERE CorreetProfileAssigrmnt :HfeTaperedSwep.AreaProfiles(SELF\IfeSweptAreaSolid.SweptArea,SELF.End SweptArea); END_ENTITY
正圆性 (IfeRight CircularCone)	ENTTTY IfcRighrCircularCone SUBTYPE OF IfcCsgPrimitive3D; Height:IfePositiveLengthMeasurei BottomRadius;IfePositiveLengthMeasure; END_ENTITY
正圆柱 (lfeRigheCircular Cylinder)	ENTITY IfcRigheCircularCylinder SUBTYPE OF IfkCsgPrmitive3D, Height:IfcPositivel engthMeasure; Radius:lePositiveLengthMeasure; END_ENTITY
切片脊柱 (lfkSectionedSpine)	ENTITY lfeSeetionedSpine SUBTYPE OF IkGcometricRepresentationlem; SpineCarve :HeCompositeCurve; CrossSections;LIST [2:?]OF fePrcileDf; CrossSeetionPositions:LIST[2:?]OF Icaxis2Placement3D DERIVT Dim:lidDimensionCount :=3; WHERE CorrespondingSectionPositions:SIZEOF(CossSections)=SIZEOF(CrossSeeticmPositions); ConsistentProfileTypes:SIZEOF(QUERYItemp< • CrossSections|CrossSections[1].ProfileType temp.ProfleType))-0; SpineCurveDim:SpineCurve.Dim -3; END_ENTITY
基于壳的表面模型 (lfeShellBised SurfaceMode)	ENTITY lfcShelIBasedSurfaceModel SUBTYPE OF IfcGrometricRepresentationllem; SbsmBoundary,SET [1,7]OF NeShell; DERIVE Dm:KeDimensionCount :-3; END_ENTITY
立体模型 (lkeSoldModel)	ENTTTY IfcSo5dModdl ABSTRACT SUPERTYPE OF(ONEOF(lkCsgSolid,HcManifoldSolidBrep,IfeSwepeAresSolid.feSwept DiskSolid)) SUBTYPE OF IkGrometricRepresentationlem; DERIVE Dm:IKcDimensionCount ;=3; 12*D_PTITY

续表D.&.2

实体	EXPRESS操述
球 (lieSgthere)	ENTITY HeSphere SUBTYPE OF HeCsgPrimitive3D; Radius,HcPositiveLengthMeasure; END_ENTITY
面线扫掠体 (lfeSurfaceCurve SweptAreaSolid)	ENTITY HeSurfaceCarveSwept.AreaSolik SUBTYPE OF HeSweptAreaSolid; Directrix :HfeCurve; SarntParmm:OPTIONAL.IfeParameterValue; EndParam;OPTIONAL IfcParameterVilue; ReferenceSurfsce:HfeSurface; WHERE DirectrixBeunded :(EXISTS(SanParan)AND EXISTS(EndPamm))OR(SIZEOF([IFCGEOMETRYRE SOURCE.IFCCONIC,"IFCGEOMETRYRESOURCE IFCBOUNDEDCURVE]•TYPEOF(Directrix))- 1): END_ENTTTY
扫掠面 (HfeSwepAreaSolid)	ENTITY HeSweptAresSolid ARSTRACT SUPERTYPE OF(ONEOF:IcExtrudedAreaSolid,IfcFixodReferenceSweptAreaSoid.lfe RevolvedAreaSolid.IfeSurfaoaCurveSweptAreaSolid)) SUBTYPE OF IfeSolidModel: SweptArea,IfeProfileDdf; Position:OPTIONAL HcAxis2Placemert3D; WHERE SweptAreaType:SwepeArea.ProdleTyre -IfcProfileTypeEnum.Areas END ENTITY
扫掠圆盘体 (lfeSweptDiskSolid)	ENTITY IfeSwepeDiskSolid SUPERTYPE OF(HeSweptDiskSolidPolygonal) SUBTYPE OF HcSolidModel; Direetrix:HfeCurve; Radius:fePositivelengthMeasure; InnerRadius;OPTIONAL.IicPositiveLangthMeasures SanPamm:OPTIONAL IfcParameterValoe; EndParam:OPIONAL NcParameterVilue; WHERE DreetrixDim:Directrix.Dim-3: InnerRadiusSize;(NOT EXISTS(InnerRadius))OR(Radius >InnerRadius); DireetrixBounded:(EXISTS(StartParam)AND EXISTS(EndParam))OR(SLZPOF[IFCGEOMETRYRFS OURCE IFCCONIC.'IFCGEOMETRYKESOURCE.IFCBOUNDEDCLRVE]•TYPEOF(Directrix))- 1); END_ENTITY
多边形扫掠圆盘体 (feSwepaDskSolid Polygonal)	ENTTTY HeSwepeDiskSolidPolygonal SUBTYPE OF HeSwrptDiskSolid; FalletRadius :OPTIONAL IePositiveLangthMeasures WHERE CorrectRadii,NOT(EXISTS(FilletRadis))OR(FalletRadius >=SELF\IeSwepaDiskSolid.Radus); DrectnxlsPolyline:'IFCGEOMETRYRESOURCE.IFCPOLYLINE IN TYPEOF(SELF\HeSwept DiskSolid.DIrectrix); END_ENTITY
细分面集合 (IfeTessellated FaceSe)	ENTTTY HeTessellatedFaceSet ABSTRACT SUPERTYPE OF(IfeTriangulstedFaceSet) SUBTYPE OF HcTesellatedltem; Coordinates:IfcCartesianPointList3D; Normals:OPTIONAL.LIST [1:?]OF LIST [3,3]OF IfcParameterValue; Closed:OPTIONAL BOOLEAN; INVERSE HasColours;SET [0;1]OF Iflndexeck'olourMap FOR MappedTo; HasTextures:SET [O:?]OF IfelndexalTextureMap FOR MappedTo; END_ENTITY

实体	EXPRESS捕述
细分项 (IfcTessellatedltem)	ENTITY IfeTessellatedltem ABSTRACT SUPERTYPE OF(HcTessellatdFaceSet) SUBTYPE OF IfkGcometricRepresentationlem; END_ENTITY
细分三角面集合 (He Triangulated FaceSet)	ENTTTY Ifc TriangulatedFaceSet SUBTYPE OF IKkTessellstedFaceSet; Coordlndex:LIST [1:?]OF LIST [3:3]OF INTEGER; Nomallndex:OPTIONAL LIST [1:?]OFLIST [3:3]OF INTEGER; DERIVE NumberOfTrangles:INTEGER;=SIZEOF(CoordIndex)a END_ENTITY

D.8.3 几何模型资源函数的EXPRESS 描述应按表D.8.3 的规定采用。

<p align="center">表 D.8.3 几何模型资源函数的 EXPRESS 描述</p>

函数	EXPRFSS措述

点乘函数
(IfeDoaProduct)
	FUNCTION NeDotProduct
	  (Argl.Arg2,IfeDirection)
	    :KEAL
	LOCAL
	  Solar:REAL;
	  Veel,Vec2,lfcDirection:
	  Ndim:INTEGER;
	END_LOCAL;
	  IF NOT EXISTS(Arg1)OR NOT EXISTS(Arg2)THEN
	    Selar=7;
	  EISE
	    IF(Argl.Dm <>Arg2.D(m)THEN
	      Salsr ;=?;
	    EISE
	      BBGIN
	        Vecl:=HeNormslise(Argl)
	        Vec2:=HfeNormslise(Arg2);
	        Ndim;-Argl.Dim;
	        Scalar ,-0.0;
	        REPEATi:=1TO Ndim;
	          Scalar ;=Scalar +Veel.DirectionRatios[i]•Vee2.DirectionRatios[i];
	        END_REPEAT:
	      END;
	    NDIF
	  END_IF;
	  RETURN(Salar);
	END_FUNCTION

锥形扫掠面截面
检查函数
(lfeTaperedSwept AreaProfiles)
	FUNCTION HeTaperedSweptAreaProfiles
	(SartArea,EndArea,IfcProfileDeD
	:LOGICAL;
	LOCAL
	  Result:LOGICAL:=FALSE:
	END_LOCAL₄
	IF CIFCPROFILERESOURCE.IFCPARAMETERIZEDPROFILEDEF IN TYPEOF(StartArea))THEN
	  IF(IFCPROFIL ERESOURCE.IFCDERIVEDPROFILEDEF IN TYPEOF(EndArea))THEN
	    Kesult:=(StartArea:=:EndAreal IHcLenvedf'rotleLkt.FarentFrotle);
	  ELSE
	    Result:=(TYPEOF(SartArea)=TYPEOF(EndArea));
	  END_IF;
	ELSE
	  IF 'IFCPROFILERESOURCE IFCDERIVEDPROFILEDEF IN TYPEOF(EndArea))THEN
	    Result:=(StartAres:=:EndAreadfcDerivedProfileDef.ParentProfile);
	  EI.SE
	    Result;=FALSE:
	  END_IF;
	END_IF;
	RETURN(Result):
	END FUNCTION

续表D.&.3

函数	EXPRESS操述

矢量和函数
(feVectorSum)
	FUNCTION IfcVectorSum
	　(Argl,Arg2:lfcVectorOrDfrection)
	　　,IteVector
	LOCAL.
	　Result　:IfeVector;
	　Res,Veel,Vec2;HcDirection;
	　Mag.Magl.Mag2:REAL:
	　Ndim:INTEGER;
	END　LOCAL:
	　IF((NOT EXISTS(Argl))OR(NOT EXISTS(Arg2)))OR(Argl.Dm <>Arg2.DXm)THEN
	　　RETURN(?)
	　ELSE
	　　BEGIN
	　　　IF'IFCGEOMETRYRESOURCE.IFCVECTOR' IN TYPEOF(Arg1)THEN
	　　　　Mngl;-ArgI\lfeVector.Magnitude:
	　　　　Veel:=Argl\fcVector.Orieatationn
	　　　ELSE
	　　　　Migl;-1.0;
	　　　　Vecl =Argli
	　　　END_IF;
	　　　IF'IFCGEOMETRYRESOURCE.IFCVECTOK IN TYPEOF(Arg2)THEN
	　　　　Msg2;=Arg2\IleVector.Mapiis,
	　　　　Vee2,-Arg2\IlcVector.Oricatation;
	　　　ELSE
	　　　　Mng2:=1.0;
	　　　　Vee2-Ag2;
	　　　END_IF;
	　　　Veel:-IfeNormalise(Veel);
	　　　Vee2:=feNormalise　(Vee2);
	　　　Ndim:=SLZBOF(Vecl.DfreeticnRatios);
	　　　Mug　　:-0.0;
	　　　Res,-HcRepresentationltem()\I eGeometricReprescntationltem()\I IfcDirection([0.0;
	Ndim]);
	　　　RFPEATi:=1TO　　Ndim;
	　　　　Res.DireetionRatios[i],-Magl・Vecl.DirertionRatios[i]+Mag2・Vec2.DirectionRatios[i]:
	　　　　Mag;=Mag+(Res DirertionRatios[i]・Res DirectionRatios[i]);
	　　　END_REPEAT;
	　　　IF(Mag>0.0)THEN
	　　　　Result:=HeRepresentationlem()\I IfeGecmetricRepresentationltem()\I KcVector(Res,
	SORT(M=n)),
	　　　　EISE
	　　　　Result,　IfcRepresentaticnltm()\I HrGeometrikRepresentaticnltem()\I HcVectoe(Veel.
	0.0);
	　　　END_IF;
	　　END;
	　END_IF;
	　RETURN(Result);
	END_FUNCTION

D.9　几　何　资　源

D.9.1　几何资源类型的 EXPRESS描述应按表 D.9.1的规定采用。

表D.9.1　几何资源类型的 EXPRESS　描述

类型	EXPRESS描述
维数 (lfeDimensionCount)	TYPE HeDimensionCount -INTPGER: 　　WHERE 　　WR1:(0<SELF<=3): 　　END_TYPE

类型	EXPRESS捕述
B样条曲线样式枚举 (IicBSplineCurveForm)	TYPE licBSplineCurveForm -ENUMERATION OF(POLYLINE_FORM. CIRCULAR_ARC. ELLIPTIC_ARC。 PARABOLIC_ARC, HYPERBOLJC_ARC, UNSPFCIFIED); END_TYPE
B样条曲面样式枚举 (IfeRSplineSurface Form)	TYPE IIeBSplineSurfnceFom-ENUMERATION OF(PLANE_SURF. CYLINDRICAL.SURF, CONICAL_SURF, SPHFRICAL.SLRF, TOROIDAL SURF, SURF_OF_REVOLUTION. RULED_SURF, GENERALISED CONE, QUADRIC_SURF, SURF_OF_LINEAR_EXTRUSION. UNSPECIFIED); END_TYPE
节点向量类型枚举 (IfkKnot Type)	TYPE IfcKnotType =ENUMERATION OF(UNIFOKM KNOTS, QUASLUNIFORM_KNOTS, PIECEWISE_BFZIER_KNOTS. UNSPECIFIED); END_TYPE
过渡代码枚举 (lteTmnsitionCode)	TYPE IicTrmnsitionCode-ENUMERATION OF(DISCONTINUOUS, CONTINUOUS. CONTSAMEGRADIENT. CONTSAMEGRADIENTSAMECURVATURE) END_TYPE
战剪优先权枚举 B.Trieing Preference)	TYPE IleTrimmingPreference =ENUMERATION OF(CARTESIAN, PADAFTED UNSPECIFIED); END_TYPE
轴2方位 (IfcAxis2Placement)	TYPE IfcAxis2Placement -SEIPCT(IfcAxis2Placement2D, IfcAxis2Placement3D); END_TYPE
面上由线 (IfeCurveOnSurface)	TYPE IfeCurveOnSurface =SEL.ECT(lfcCompositeCurveOnSurface, IfcFcurve); END_TYPE
裁剪选择 (HeTrimmingSelext)	TYPE IfeTrimmingSeleet =SELECT(lfeCartesiunPoint, IfcParameterValue); END_TYPE
矢量或方向 (leVectorOr Direetion)	TYPE IfeVectorOrDirecticn =SELECT(lfeDfrectioe. lfeVeetar); E*D_TYTE

D.9.2 几何资源实体的 EXPRESS描述应按表D.9.2 的规定采用。

<div align="center">表 D.9.2 几何资源实体的 EXPRFSS 描述</div>

实体	EXPRESS描述
轴1方位 (HcAxislPlacement)	ENTTTY IfcAxislPlacement SUBTYPE OF HcPacement; Axis:OPNONAL.IfcDirecticm; DERIVE Z,licDMrextion ;=NVL(IfeNormalise(Axis),HcRepresentationltem()|I lfcGeometricRepresentationltem O|l IfcDKrection([0.0,0.0,1.0])); WHERE AxislsaD.(NOT(EXISTS(Axis)))CR(Axis Dim=3): LocationIssD:SEI.F\IfePlacement.Locatice.Dim=3: END_ENTITY
二维轴2方位 kIfeAxis2Placement2D)	ENTITY HcAxis2Placement2D SUBTYPE OF HePlacement; RefDireetion:OPTIONAL.lfeDirecticns DERIVE P:LIST [2:2]OF NeDrextion:-lfcEuild2Axes(RefDirection); WHERE RefDrls2D,(NOT(EXISTS(RefNrecion))OR(R.Tireetinn Nim=2), Locationls2D;SELF\IfcPlacement.Locrtion.Dim =2; END_ENTITY
三维轴2方位 kIfeAxis2Placement3D	ENTTTY HeAxis2Placement3D SUBTYPE OF fcPlacement; Axis:OPTIONAL IfcArectioni RefDirection:OPTIONAL IfeDirectice; DERIVE P:LIST [3:3]OF IKcDireetion:-lfefuildAxes(Axis,RefDirection); WHERE Locatenls3D:SEI.F\IfkPlacement.Locatica.Am-3; AxisIkJD:(NOT(EXISTS(Axis)))OR(Axis.Dim=3); RefDirls3D:(NOT(EXISTS(RefDirecion)))OR(RefDirection.Dm=3); AxisToRefDirPositice:(NOT(EXISTS(Axis)))OR(NOT(EXISTS(RefDirection)))OR(lfeCrossProd uct(Axis,RefDirection).Magnitude >0.0); AxisAndRefDirProvisicn:NOT((EXISTS(Axis))XOR(EXISTS(RefDirection))); END_ENTITY
边界曲线 (HcBoundaryCurve)	ENTITY HcBoundsryCurve SUPERTYPE OF(fcOuterBoundarn;Carve) SUBTYPE OF IfcCompositeCurveOnSuriace; WHERE IsClosed:SELF\IfcCompositeCurve.ClosedCurver END_ENTITY
有界曲线 (lfeBoundedCurve)	ENTITY HeBoundelCarve ABSTRACT SUPERTYPEOF(ONEOF:HcBSplineCarve,IleCompositeCurve,HcPolyline,IfeTrimmed Curve)) SUBTYPE OF HeCurver END_ENTITY
有界曲面 (HeBoundedSurface)	ENTITY IfeBoundedSurface ABSTRACT SUPERTYPE OF (ONEOF (IicBSplinesurface,HcCurveBoundedplane, HeCurve BoundedSurface, HeReetangular TrimmedSurface)) SIBTYPE OF Ifcsurfacer END_ENTITY

续表D9.2

实体	EXPRESS捕述
B样条曲线 (HeHSplineCurve)	ENTTTY IfcBSp&ineCurve ARSTRACT SUPERTYPE OF(IfcBSplineCirveWithKnots) SUBTYPE OF IfcBoundedCurve; Drgree:INTEGER; ControlPointsList :LIST [2:?]OF IfeCartesianPoint; CurveForm:HcHsplineCurveForm; ClosedCurve:LOGICAL; SelfIntesect :LOGICAL; DERIVE UpperlndexOnControlPoints:INTEGER:=(SIZEOF(ControlPointsList)-1); ContolPoints;ARRAY [0,UvperlndexOnControlPoints]OF IfeCartesianPoint ;-IfeList ToArray(Control Pointslist,0.Upperlndex hiControlPoints); WHERE SameDm:SIZFOF(QUFRY(Tcmp< • ControlPointsList|Temp.Dm <>ControlFointslist[1].Dim)) =0; END_ENTITY
节点向量B样条曲线 (IfcBSplineCurve WithKnots)	ENTTTY IfcHSplineCarveWithKnots SUPERTYPE OF(IfcRatioralHSplineCurveWithKnots) SUBTYPE OF IlcBSplineCurve; KnotMultiplicities;LIST [2:?]OF INTECER; Knots:LIST [2:?]OF MePsrameterValuer KnonSpee;fcKnotType; DERIVE UpperlndexOnKnots:INTEGER:=SIZEOF(Knots); WHERE Consistent RSpline:IicConstraintsParamBSyline(Degree,UpgerlndexOnKnots,UpperlndexOeControl Points.KnoeMultiplicities,Knots); CorrespoedingKnoeLists:SIZEOF(KnotMutiplicities)-UpperlndexOnKnots; END ENTITY
B样条曲面 (lfeBSplineSurface)	ENTITY IfeBSplineSurface ABSTRACT SUPERTYPE OF(IfcBSplineSerface WithKnots) SUBTYPE OF IfkBoundedSurface; UDgree:INTEGER: VDrgree:INTEGER; ContralPointsList:LIST[2:?]OF LIST[?₄?]OF feCartesianPoint; SurfacForm:eHSplineSurdaceForm; UClosed:LOGICAL: VClosed ;LOGICAL; SelfIntersect :LOGICAL; DERIVE UUpper:INTEGER:=SIZEOF(Controlfointslist)-1; VUpper:INTEGFR:=SLZPOF(ControlFointsList[1])—1; ControlPoints:ARRAY[0;UUpper]OF ARRAY [0,VUpper]OF IfcCartesiinPoint ;-IfeMakeArmy OArry(ControlPointsList.0,UUpper,0,VUpper); END_ENTITY
节点向量B样条曲面 (lfBSplineSurface WithKnots)	ENTITY IfeBS lineSurface WithKnots SUPERTYPE OF(feRsticnal HSplineSurfac WithKnots) SUBTYPE OF IfkBS plineSurface; UMultiplikities;LIST [2:?]OF INTEGEF; VMultiplicities;LIST [2:?]OF INTEGER; UKnots:LIST [2;?]OF IcParameterValue; VKnots:LIST [2.?]OF HcParameterValue: KnouSpee:IfcKnotType; DERIVE KnotVUpper:INTEGER;=SIZEOF(VKDOts) KneUUpper:INTEGER;=SIZEOF(UKnots); WHERE UDirextionConstraints:lfeConstraintsParanBSpline(SEL.F\IfeHsplimeSurface.UDrgree,KnotUUpper, SELF\HeBSplineSurface.UUpper,UMultiplkities,UKnots); VDirectionConstraints,lfeConstraintsParanBSpline(SELF\IfcBSplineSurface,VDrgree,KnotVUpper, SELF\HeHSpline:Surface.VUpper,VMultipfrities,VKnots); CoerespoedingUists:SLZEOF(UMultiplicties)-KnorUUpper; Coeresponding VLists:SIZEOF(VMultiplicties)-KaotVUpper; LND LNI11Y

实体	EXPRESS操述
笛卡尔点 (IfeCartesianPoing)	ENTITY HcCartesianPoint SUBTYPE OF IcPoint; Coordinates;LIST [1;3]OF fclengthMessure; DFRIVF Dm:HfeDimensiceCount:=HIINDEXICoordnates); WHERE CP2Dor3D:HIINDEX(Coordinates)>=2; END_ENTITY
苗卡尔变换运算符 (feCartesian Transform atioeOperator)	ENTTTY HcCartesian TransformaticeOperator ABSTRACT SUPERTYPE OF(ONEOF:HeCartesian TransformationOperator2D,HeCartesianTransforma ticeOperator3D)) SUBTYPE OF HcGcometreRepresentationltem Axisl:OPTIONAL.IfcDirection; Axis2:OPTIONAL HcDirection; LocalOrigin:IfeCartesianPoint; Scale,OPTIONAL REALA DERIVE Sd:REAL:-NVL(Scale,1.0); Dm;HcDimensionCount ;-LocalOrign.Dem; WHERE SleGreaterZero,Sd >0.0; END_ENTTTY
二维苗卡尔变换 运算符 (IfeCartesian Transformaticn Operatoe2D)	ENTTTY HeCartesian TransformsticeOurator2D SUPERTYPE OF(IfcCartesian TmnsformationOperator2DnonUniform) SUBT YPE OF IfcCartesian TansformatimrOperatori DERIVE U:LIST [2:2]OF HcDrection:=fcBaseAxis(2.SELF\IfcCartesisn TransformsticeOyerator.Axisl. SEI.F\HeCartesianTransfomationOperane.Axis2,?); WHERE DimEqual2;SELF\HcCartesinn TransfomatioeOperator.Dim=2; AxisI1s2D:NOT(EXISTS(SEIF\IfcCertesian TansfomationOperator.Axis1))OR(SELF\HeCartesinn TransfomationOperstor.Axisl.Dim =S); Axis2I2D:NOT(EXISTS(SEIF\IfeChrtesian TansfomationOperator.Axis2))OR(SELF\lieCartesinn TransformationOperator.Axis2.Dim -2); END_ENTITY
二维笛去尔韭均匀 比例变换运算符 (1feCsrtesian Transformation Operator2Dmon Uniform)	ENTITY HcCartesian TransformationOperator2DhomUniform SKTYPE OF HeCartesian TransfarmatirOperatoe2D; Scale2:OPTIONAL REALa DERIVE Sd2;REAL;=NVL(Scale2,SELF\IkCartesian TransformationOperator.Sd); WHERE Scale2GreaterZero;Sdl2>0.0; END_ENTITY
三维笛卡尔 变换运算符 (IfeCartesian Trans formation Operator3D)	ENTITY HeCartesian TransformaticeOperator3D SUPERTYPE OF(IfcCartesian TransformationOperatoe3DnonUniform) SUBTYPE OF IcCartesian TransformatimOperator; Axis3,OPTIONAL.HrDirrctiom; DERIVE U:LIST [3:3]OF HeDXrection ;=llcBaseAxis(3,SELF\IicCartesian TransformaticeOperator.Axisl, SEIF\IKeCartesian TransformationOperar,Axis2,Axis3); WHERE Dimls3D;SELF\IfeCartesian TransformstionOperatoe.Dim=3. AxislIs3D:NOT(EXISTS(SEL.F\H-Ca:tesian TransformationOperatot.Aaisl))OR(SELF\ieCartesian TransfomstionOperator.Axisl.Dm=3); Axis21x3D:NOT(EXISTS(SELF\IMcCartesian TransformationOperator.Axis2))OR(SEIF\llcCartesian TransformationOperatoe.Axis2.Dm-2); Axis3Is3D,NOT(EXISTS(Axis3))OR(Axis3.Dim=3); E*D_EWTTTY

续表D9.2

实体	EXPRESS捕述
三维笛卡尔非均匀比例变换运算符 (eCartesian Transformation Opemtor3 DnonUniform)	ENTTTY IfcCartesian TransformationOperatoe3DnonUniform SUBTYPE OF IkCartesianTransfomationOperator3D; Scalk2:OPTIONAL REAL; Scale3:OPTIONAL REAL; DERIVE Scl2;REAL;=NVL(Scalk2,SELF\lieCartesianTransformationOperator,ScD); S13:REAL:=NVL(Scale3,SEIF\IfcCrtesisnTransformstioeOperator.Scl); WHERE Sale2GreaterZero:Scl2 >0.0; Scale3GreaterZero:Sd3 >0.0; END_ENTITY
圆 (HieCirle)	ENTTTY IfCirtcle SUBTYPE OF IfcConic; Radius:lfePositiveLengthMeasure; END_ENTITY
复合曲线 (HeCompositeCurve)	ENTITY IfcCompositeCarve SUPERTYPE OF(HCompositeCurveOnSurace) SUBTYPE OF IfcBoundedCurve; Segments,LIST[1,?]OF lfcCompositeCarveSegment; Sdflntersect:LOGICAL; DERIVE NSrgments:INTEGER:=SIZFOF(Segments); ClosedCarve;LOGICAL;=Segments[NSigments].Transition <>Dscontimuous; WHERE CurveContinaous;((NOT CbsedCurve)AND(SIZEOF(QUERY(Temp<•Segments|Temp.Tansition =Dscontinuoas))=1))OR《((CowcCure)AND(SLZEOF(QUERY(Temp<•Segments I Temp Transitson-Disccetinuous))=0)): SameDm:SIZEOF(QUERY(Temp<•Segments |Temp.im Segments[1],Dim))-0 END_ENTITY
面上复合曲线 (HfeComposite CurveOnSurface)	ENTTTY IfkCompositeCurveOnSurface SUPERTYPE OF(1fcHeundaryCarve) SUBTYPE OF IfeCompositeCarve; DERIVE BasisSurface:SET [0:1]OF HcSurface:-HcGetBasisSurface(SELF); WHERE SameSurface:SIZEOF(BasisSurface)>0; END ENTITY
复合曲线段 (HeComposite CurveSegment)	ENTITY lfeCompositeCurveSegment SUPERTYPE OF(McReparametrisedCompoiteCurveSegment) SUBTYPE OF IkGcometricRepresentationllem; Transition:He TransiticeCode; SameSense,BOOLEAN; ParentCurve :HfcCurvei INVERSE UsingCurves:SET[1:?]OF McCompositCurve FOR Segmentsy DERIVE Dim16-DimensinnCount ;-ParensCurve.Mim, WHERE ParentlsBoundedCarve;CIFCGEOMETRYRESOURCE IFCHOUNDEDCURVE IN TYPEOF(Parent Curve))i END_ENTITY
圆锥由线 (IfeConic)	ENTITY IfcConie ABSTRACT SUPERTYPE OF(ONEOF(I6Cirle.fcFlipse)) SUBTYPE OF IfCurvei Position:HfeAxis2Placement; END_ENTITY

续表D.9.2

实体	EXPRESS操述
曲线 (HeCurve)	ENTTTY HeCurve ABSTRACT SUPERTYPE OF(ONEOF:IHcBoundedCurve,lfcConic,HcLine,lkOffsetCurve2D,IfcOffset Curve3D,HcPcurve)) SUBTYPE OF IcGeometrikRepresentatiomltem; DERIVE Dim:HeDimensiorCount:-lfeCarveDm(SELF); END_ENTITY
曲边有界平面 (16eCurveBounded Plane)	ENTTTY HeCurveBoendedPlane SUBTYPE OF HcBoundedSurfacei BasisSurface:fePlane; OoterBoundary:lfcCurvei LnnerBoundanies:SET OF IfeCurve; END_ENTITY
由边有界曲面 (16cCurveBounded Surface)	ENTTTY IcCurveBoundedSurface SBTYPE OF IfcBoundedSurfacer BasisSurface:lfeSurfaces Boundaries:SET[1,?]OF IfeBoundaryCurve; ImplicitOuter:BOOLEANI END_ENTITY
圆社面 (0UeCylindrnical Surface)	ENTTTY HeCylindricalSurfsce SUBTYPE OF IfcElementarySurface; Radius:HfePositivelengthMeasure; END ENTITY
方向 (IicDirection)	ENTITY IfcDirection SUBTYPE OF HeGeometricRepresentstinltem; DirectionRstios:LIST[2:3]OF REAl$_4$ DERIVE Dim:HcDimensionCount ,-HIINDEXIDfrectionRatios) WHERE MsgnitudrGreaterZeo:SIZFOF(QUERY(Tmp< • DirectionRatios|Tmp<>0.0))>0; END_ENTITY
基本曲面 (1cFZementary Surface)	ENTITY UcElementarySurface ABSTRACT SUPERTYPE OF(ONEOF;HeCylindrealSurface,fePlane)) SUBTYPE OF HeSurface; Position:IfeAxis2Plaeement3D; END_ENTITY
桶圆 (1cElipse)	ENIII T HctIlpse SUBTYPE OF IfcConic; SemiAxisl :HfePositivel.engthMeasure; SemiAxis2,IfePositivel.engthMeasure; END_ENTITY
几何表达项 (IieGeometrie Representaticnltem)	ENTITY HeGeometricRepresentationlren ABSTRACT SUPERTYPE OF(ONEOF:HfcAnnotstionFillArea.HcooleanResalt,IeBoundingBox,IfeCart esianPointList,IfcCartesianTransfomatinOperntor,IicCompositeCurveSegment,IfeCsgPrimitive3D.Ife Curve.IfeDfreetion,lleFsceBasedSurfacModel,IfcFillAreaStyleHatching,IicFlAreaStyleTiles,lfcGeomet reSet,IfcHalfSpareSolid.Hel igheScuree,IfcPlacement,IfePlanarExtent,HcPoint,lfkeSectionedSpine,Ife ShellResedSuriaceModel.IkSoliaModel.IfcEufacs,HeTeskllatedlem,IfeTanLitcral,HeVector)) SUBTYPE OF IfcRepresntationltem: END_ENTITY
直线 (lfeLine)	ENTITY HcLine SUBTYPE OF HfeCurve; Pat:HeCartesianPoint; Dr;HeVector: WHERE SameDim:DAr.Dim =Pht.Dim; END_ENTITY

实体	EXPRESS捕述
映射项 (IfeMappedltem)	ENTITY IfeMappedltem SUBTYPE OF KcRepresentationltem MappingSouroe:IlkRepresentationMspi Mapping Target;HcCartesian TansformaticnOperator; END_ENTITY
二维偏置由线 (lfcOffsetCurve2D)	FNTITY IkOHstCurve2D SUBTYPE OF 1fCurvei BasisCurve:HcCurver Distance,IfeLengthMeasure; SelfIntersect ,LOGICAL; WHERE Dmls2D,BesisCurve.Dim=2: END_ENTITY
三维偏置曲线 lfcOffsetCurveSD	ENTITY lfcOfsetCurve3D SUBTYPE OF IkCurve; BasisCurve :IfeCurve; Dstance:IfeLngthMeasure; Selflntersect :LOGICALa RefDrection:IfcDirection; WHERE Dmls3D,BasisCurve.Dim=3: END_ENTITY
外边界曲线 (licOuterBoundary Curve)	ENTITY IfcOuterBoundaryCurve SUBTYPE OF lfcBoundaryCarve; END_ENTITY
P曲线 (HfePeurve)	ENTITY lfcPurve SUBTYPE OF IfCurve; BasisSurface:IfeSurface: RefereneeCurve :licCurve; WHERE Dimls2D,ReferenceCurve.Dm=2; END_ENTITY
方位 (fePlaerment)	FNTITY IfcPlocemen ABSTRACT SUPERTYPEOF(ONEOF(IfAxislPlacement,IfcAxis2Placement2D,IlcAxis2PXacement3D)) SUBTYPE OF IkGcometricRepresentationlem: Location,feCartesianPoint; DERIVE Dim:IfeDimensionCount :=Location.Dm; END_ENTTTY
平面 (fcPlane)	ENTTTY fcPlane SUBTYPE OF IkElementarySurface; END_ENTITY
点 (lfcPoint)	ENTITY IfcPoint ABSTRACT SUPERTYPE OF(ONEOF(ICartesianPoint,IicPoinrOnCurve,IfcPointOnSurface)) SUBTYPE OF IkcGcometricRepresentationlem; END_ENTITY
曲线上点 (llePoineOhCurve)	ENTITY lfcPointOnCurve SUBTYPE OF IKcPointt BasisCurve:HeCurve; PointParameter:IfcParameterValue; DERIVE Dm,lieDimensionCount ,-BasisCurve.Dmi END_ENTITY

实体	EXPRESS操述
曲面上点 (lfcPointOnSurface)	ENTITY IfcPointOnSurface SUBTYPE OF HcPoint; Bast.Surfnce,lfeSurfiee; PointParameterU,fcParameterValue; PointPammeterV:IicParameterValuei DERIVE Dm:HfcDimensionCount :=BasisSurfice.Dim; END_ENTITY
折线 (fePolyline)	ENTITY HePolyline SUBTYPE OF IfcBoundedCurve: Points:LIST [2:?]OF MeCartesianPoist; WHERE SameDim;SLZEOF(QUERY(Temp<・Pants|Temp.m<>Points[1].Dm))=0; END_ENTITY
节点向量有理 B样条曲线 (feRationalBSpline CurveWithKnots)	ENTTTY HcRationalBSplimCurve WithKaots SUBTYPE OF IfeBSplineCurveWithKnots; WeightsDhta:LIST[2:?]OF REAL₄ DERIVE Weights:ARRAY [o,UpperlndesOeCantrolPoints]OF REAL;=IfcListToArray(WeightsData,0.SELF\ IlelSplineCurve.UpperlndexOrControlPunts); WHERE SmeNumOIWeightsAndPoints:SIZEOF(WeighrsDta)=SLZROF(SEI.F\IfeBSplineCurve. ControlPointslist); WeightsGreaterZero:IlcCurve WeightsPositive(SELF); END_ENTITY
节点向量有理 B样条曲面 (feRationalRSpline SurfaceWithKnots)	ENTITY HeRationalRSplineSurface Withknots SUBTYPE OF HeHSplineSurface WithKnots: WeightsData:LIST [2:?]OF LIST [2:?]OF REAL; DERIVE Weights:ARRAY[0:UUpPer]OF ARRAY [0,VUpper]OF REAL.-IcMakeArayOfArmy(Weights Dota,0,UUpper.0,VUpper); WHERE Corresponding WeightsDntaLists;(SLZB)F(WeightsData)=SIZEOF(SELF\HebSplineSurface. ControlPointsl.ist))AND(SLZPOF(WeizhtsData[1])-SIZEOF(SELF\IicBSplineSur face.ControlPointslist[1])); WshVsluCateZer,tf EudaWeighsPositive(SELF); END_ENTITY
矩形裁剪曲面 (IfeReetangular TrimmedSurface)	ENTTTY IcRectangular TrimmedSurface SUBTYPE OF IfcBoundodSurfacei BasisSurface,lfeSurface; U1:lfcParameterValue; V1,lfcParameterValoei U2,IkPemmeterVduei V2:lfeParameterValue; Usense:HOOLEAN; Vsense:BOOLEAN: WHERE UiAndU2Diferent:Ui<>U2; V1AndV2Dfferent:V1<>V2; UsenseCompatible:(CIFCGEOMETRYRESOURCE.IFCELEMENTARYSURFACE IN TYPEOF(Basis Sursce))AND(NOT('IFCGEOMEIRYRESOURCE.IFCPLANE'IN TYPEOF(BasisSurface))))OK CIFC GEOMETRYRESOURCE.IFCSURFACEOFREVOLUTION IN TYPEOF(BasisSurface))OR(Usense - (U2>)); VsenseCompetible:Vsense =(V2>VI); E.ND_ENIIIY

续表D9.2

实体	EXPRESS捕述
重参数化复合由线段 (IfcReparametrised CompositeCarve Sgment)	ENTITY IfcReparametrisedCompositeCurveSegment SUBTYPE OF IfeCompositeCurveSegment; ParamLength:IfcParameterValue; WHERE PositiveLengthPammeter:PammLength >0.0; END_ENTTTY
表达项 (IfeRepresenta tionltem)	ENTTTY IkeRepeesentatiomltem ABSTRACT SUPERTYPE OF(ONEOF(TcGcometricRepresentationltem,HcMappedltem,HeStyledltem. lfe TopologicalRepresentationltem)): INVERSE LayerAssignment;SET [0,1]OF HcPresestationLayerAssignment FOR Assignedltems; StyledByltem;SET [o,1]OF HeSyledlten FOR Item; END_ENTITY
表达映射 (HcRepresen tationMap)	ENTITY IfeRepresentsticeMsp MappingOnigin:IfkAxis2Placement; MappedRepresentation,HcRepresentation; INVERSE HasShapeAspexts,SET[0,?]OF IfcShapeAspect FOR PartOfProductDefinitionShape; MapUsage:SET OF eMapgedltem FOR MappingSourcer WHERE ApplicableMappetRepr:'IFCREPRESENTATIONRESOURCE.IFCSHAPEMODEI.'IN TYPEOF(Mapped Representslicn); END_ENTITY
曲面 (HeSurfiace)	ENTITY IfeSurface ABSTRACT SUPERTYPE OF(ONEOF(IIBoundedSurface,fcElementarySurface.IfeSweptSurface)) SUBTYPE OF IfcGeometricRepresentationltem: DERIVE Dm:IeDmensionCount :-3; END_ENTITY
线性拉伸面 (IeSurfaceOY LinearExtrusion)	ENTITY IfeSurfacsOfl inrarE.xtrusion SUBTYPE OF IkeSweptSurface; ExtrudodDirection:IfeDrections Depth:HfcLengthMeasure; DERIVE ExtrusionAxis,HcVector,-fcRepresentitionltem()|1 IfcGccmetnicRepresentaticeltem()Il MeVector (FvtnduTirwrirn.Neprth). WHERE DepehGreaterZero;Depth >0.; END_ENTITY
旋转由面 (HfeSurfaceOf Revolution)	ENTTTY IfeSurfassOIRevoluticm SUBTYPE OF lieSwepeSurface; AxisPosition:IfcAxislPlacement; DERIVE AxisLine:IfeLine:-IfecRepresentaticelten()Il NcGrcometreRepresentaticnltem 0|I HeCurve()|I fe Ling(AxisPosition.Lecation,IfcRepresentafonltem()||IfeGeometricRepresentationltem()11 KeVector (AxiPmitmr.Z.1.0)); END_ENTITY
扫撩由面 (lfeSwepa.Surface)	ENTTTY IfeSwepeSurface ABSTRACT SUPERTYPE OF(ONEOF(IiSurfacOfLinearExtrusion.IieSurfacOfRevolution)) SUBTYPE OF IfeSurfacer SwepeCurve:IfeProfileDef; Position:OPTIONAL.HcAxis2Placement3D; WHERE SwepeCurveType,SweprCurve.ProflleType -lfeProfileTypeEnum.Curvei END_ENTTTV

实体	EXPRESS操述
载剪曲线 (lifeTrimmedCurve)	ENTITY IfeTrimmedCurve SUBTYPE OF IfcBoundedCurve; BasisCurve:lfcCurvei Tnml:SET [1;2]OF lfkTrimmingSelecti Trim2,SET [1:2]OF IfeTrimmingSelati SenseAgreement:BOOLEAN; MasterRepresentation,Ife TrimmingPreference; WHERE Trm1ValuesConsistnt :(HIINDEX(Tnml)=1)OR(TYPEOF(Tnml[1])<>TYPEOF(Triml[2])); Trm2VsluesConsistent :(HIINDEX(Tnm2)=1)OR(TYPEOF(Trim2[1])<>TYPBOF(Trim2[2])) NoTrimOfBoundedCuves:NOT'IFCGEOMETRYRESOURCE.IFCBOUNDEDCURVE IN TYPEOF (BasisCurve)): END_ENTITY
矢量 (lfkVetor)	ENTTTY HeVector SUBTYPE OF IeGeometricRepresentationltem; Onentation:lfeDirecticns Magnitude :HfcLengthMeasure; DERIVE Dim:HcDimensionCount :=Orientaticn.Dims WHERE MagGreaterOrEqualZero:Magnitude >=0.0; END ENTTTY

D.9.3 几何资源函数的EXPRESS 描述应按表 D.9.3 的规定采用。

表 D.9.3 几何资源函数的 EXPRESS描述

函数	EXPRESS提述

基轴
(lfeBeseAxis)
	FUNCTION IfcBaseAxis
	  (Dm:INTEGER;
	  Axis1,Axis2.Axis3:lfDKrection)
	  ,LIST [2,3]OF IfcDfrection;
	LOCAL.
	  U:LIST [2:3]OF IfcDirection;
	  Factor:REAL;
	  DI.D2:HfcDirection;
	END_LOCAL:
	  IF(Dim=3)THEN
	    DI:=NVL(IfeNormalise(Axis3).IfcRepresentationltem()11 IfeGeometricRepresentationltem()1
	IfcDirection([0.0,0.0,1.0]));
	    De =fcFirstPrjAxis(D).Axisl);
	    U,-[D0.1f-SonAPejA(DI,D2,Axis2),DI];
	  EISE
	    IF EXISTS(Axis1)THEN
	      DI:=feNormalise(Axisl);
	      U:-[DI.IfcOrthogonslCompement(DI)]:
	      IF EXISTS(Axis2)THEN
	        Factor :=IfeDotProduct(Axis?,U[2]);
	        IF(Faxtor<0.0)THEN
	          U[2].DireetionRatios[1]:=-U[2].DirectionRatios[1];
	          U[2].DirectionRatios[2]:--U[2].DirectionRatios[2]
	        END_IF;
	      END_IF;
	    EISE
	      IF EXISTS(Axis2)THEN
	        DI:HeNomalise(Axis2);
	        U: [HeOnhegonalComplenent(D)],DI
	        U[1].DirectionRatios[1]--U[1].DirecticnRatios[1]
	        U[1].DirectionRatios[2],--U[1],DirectionRatios[2]
	        ELSE
	          U,=(1fcRprcserationltem()||IkGecmetricRepresentaticnltem)||MdKrectimd[1.0.0.0])。
	              lleRepreertationlsem()||lieGecmetncRepresentaticnltem ()l|BeDirecticn((0.0,1.0))];
	        END_IF;
	      END_IF;
	    END_IF;
	  RETURN(U):
	LNU FUNIIXN

函数	EXPRESS捕述
| 二轴构建<br>(IfeBuild2Axes) | ```
FUNCTION  IfcBald2Axes
  (RefDirection:IfcDirection)
    :LIST  [2;2]OF HcDirection;
LOCAL
  D:IfcDirection  ,=NVL(IfeNormalise(RefDirecticm),
    IKeRepresentationltem()||IfcGeometricRepresentaticeltem 0|I fcDirection([1.0,0.0]));
END_LOCAL;
  RETURN([D,IfeOrthogonalComplement(D)]);
END_FUNCTION
``` |
| 轴构建<br>(IfcBuildAxes) | ```
FUNCTION  FeBuildAses
  (Axis,RefDrection:llcDirecticn)
    :LIST  [3:3]OF HcDirection;
LOCAL
  DI.D2:lkcDrecticna
END_LOCAL;
  DI:=NVL(fcNomalise(Axis).IfcRepresentationltem()|l licGeometricRepresentationltem()l|lfe
Direction([0.0,0.0,1.0]));
  D2:=lfcFirstPojAxis(Dl.RefDkrection);
  RETURN([D2,HeNormalise(HcCrossProduct(DI,D2))\IfeVextor.Orientation,DI]);
END FUNCTON
``` |
| B样条约束参数<br>(feConstraints<br>ParamBSpline) | ```
FUNCTTION UeConstraintsParamBSpline
 (Degree,UpKnots.UjCp:INTEGER;
  KsotMult  :LIST OF INTEGER;
  Knots:LIST OF  IfcParameterValue)
:BOOLEAN;
  LOCAL
    Result:BOOLEAN  ;-TRUE;
    K,Sum:INTEGER;
  END_LOCAL₄
  (•Find sum of knot multiplikities)
  Sum:=KnotMult[1];
  REPEATI;=2 TO UpKnots;
    Sum:=Sum +KnotMul[i]:
  END_REPEAT:
  (•Check limits holding for all B-spline parametrisations*)
  IF(Dgree<1)OR(UpKnots<2)OR(UpCp<Drgree)OR
   (Sum<>(Drgree+UjCp+2))TAEN
    Result:=FALSE
    RETURN(Result);
  FND_IF,
  K:=KnotMult[1]:
  IF(K<1)OR(K>D-gree+1)THEN
   Result  :=FALSE.
    RETURN(Result);
  END_IF;

  REPEATi;=2 TO UpKnots:
   IF(KmotMult[i]<1)OR(Knots[i]<=Knots[i-1])THEN
     Result:-FALSE;
     RETURN(Result):
   END_IF;
   K:KnotMult[i];
   IF(i<UpKnots)AND  (K>Degree'THEN
     Result  ;=FALSE;
     RETURN(Result);
   END_IF:
   IF(i-UpKnots)AND(K>Degree+1)THEN
     Result  ;=FAlSE:
     RETURN(Result);
   END_IF;
  END_RFPEAT;
  RETURN(result);
tHD_rUrcMON
``` |

续表D.9.3

函数	EXPRESS操述

又积
(1feCrossProduct)
	FUNCTION lfcCrossProduct
	　(Argl,Arg2:lfkDirectioe)
	　　:HVextor;
	LOCAL
	　Mg:REALa
	　Res:IteAreetion;
	　V1,V2,LIST[3;3]OF REAL
	　Result:HeVector;
	END_1OCAL;
	
	IF(NOT　　　EXISTS(Argl)OR(Arg1.Dim　　=2))OR(NOT　　　EXISTS(Arg2)OR(Ag₂.Dim
	2))THEN
	　　RETURN(?);
	　ELSE
	　　BEGIN
	　　　VI=HieNormslise(Argl)\IfeDfrection.DirectionRatios;
	　　　V2 -feNormalise(Arg2)\IfeDirection.DirectionRatiosi
	　　　Res;=IfcRepresentationltem()|IfeGeometricRepresentationltem()
	　　　　　|IfeDirection([(Vi[2]・V2[3]-Vi[3]・V2[2]),(V1[3]・V2[1]-V1[1]・V2[3])。
	(Vi[1]・V2[2]-V1[2]*V2(1))]):
	　　　Msg:=0.0;
	　　　REPEATi;=1TO　　　3:
	　　　　Mag;=Mag +Res.DirectionRatios[]・Res.DIrectionRatios[i];
	　　　END_REPEAT,
	　　　IF(Mg　　　＞0.0)THEN
	　　　　Result ,—lfcRepresentationlem()1I IleGeometricRepresentationltem()|1leVextor(Res,
	SQRT(Mag));
	　　　ELSE
	　　　　Resit,lfcRepresneationlvem)II IkGecmetncRepresentaticnltem ()\I HcVector(Argl.0.0);
	　　　END_IF:
	　　　RETURN(Result);
	　　END;
	　END_IF;
	END_FUNCTION

由线维数 (feCurve\m)	FUNCTION IfcCurveDim (Curve:feCurve) 　　　:lfcDmensionCount; 　IF CIFCGEOMETKYRESOURCE.IFCLINE IN TYPHOF(Curve)) 　　THEN RETURN(Curve\Ifcl ine.Pht.Dim); 　END_IF; 　IF 'IFCGEOMETRYRESOURCE.IFUCONIC IN TYPEOF(Cure)) 　　THEN KETUKIN(CurIltCie.fosition Dim), 　END_IF; 　IF CIFCGEOMETRYRESOURCE.IFLPOLYLINE IN TYPEOF(Curve)) 　　THEN RETURN(Curve\IfcPolyline.Points[1].Dim); 　END_IF; 　IF CIFCGEOMETRYRESOURCE.IFCTRIMMEDCURVE IN TYPEOF(Curve)) 　　THEN RETURN(NeCurveDim(Curve\lfcTrimmedCarve.BasisCurve)); 　END_IF; 　IF CIFCGEOMETRYRESOURCE.IFUCOMPOSITECURVE IN TYPBOF(Carve)) 　　THEN RETURN(Curve\IlcComposteCurve.Sogments[1].Dem); 　END_IF; 　IF CIFCGEOMETRYRESOURCE.IFURSPLINECURVE IN TYPEOF(Curve)) 　　THEN RETURNCCurve\IfckSplineCurve.ConsrulPmxLAs[1].DAm?; 　END_IF; 　IFCIFCGEOMETRYRESOURCE.IFUOFFSETCURVE2TIN TYPEOF(Cure)) 　　THEN RETURN(2); 　END_IF; 　IF CIFCGEOMETRYRFSOURCE.IFUOFFSETCURVE3D IN TYPEOF(Curve)) 　　THEN RETURN(3): 　END_IF; 　IF CIFCGEOMETRYRESOURCE.IFCPCURVE IN TYPEOF(Curve)) 　　THEN RETURN(3): 　END_IF; RETURN(?); ENU_FUNLIIUN